



LeapScholar

READING



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Introduction

Reading is the second section of the IELTS test.

1. Total time provided is 60 minutes.
2. It consists of three sections.
3. Total number of questions is 40.
4. Though you can mark and write on the Question Paper, you must enter your answers on the Reading Answer Sheet. You must write your answers in pencil. (for Paper test)
5. No extra time is given for transferring your answers from the test booklet to the Reading Answer Sheet. For Computer based tests, students need to write or mark their answers on screen.
6. The Academic and General Training Reading Tests are graded to the same level. However, because the texts in the Academic Reading Test are more challenging overall than those in the General Training Test, more questions need to be answered correctly on a General Training Test to receive the same grade.



7. The IELTS Academic reading test includes three long texts which range from the descriptive and factual to the discursive and analytical. The texts are authentic and are taken from books, journals, magazines and newspapers. Basically, this is for a non-specialist audience.
8. A variety of question types is used in order to test a wide range of reading skills.

Scoring:

- Each correct answer receives 1 mark.
- Scores out of 40 are converted to the IELTS 9-band scale.
- Scores are reported in whole and half bands.
- There is NO NEGATIVE marking.

General Training Module		Academic Module	
Raw Score	Band Score	Raw Score	Band Score
40	9.0	39-40	9.0
39	8.5	37-38	8.5
37-38	8.0	35-36	8.0
36	7.5	33-34	7.5
34-35	7.0	30-32	7.0
32-33	6.5	27-29	6.5
30-31	6.0	23-26	6.0
27-29	5.5	19-22	5.5
23-26	5.0	15-18	5.0
19-22	4.5	13-14	4.5
15-18	4.0	10-12	4.0
12-14	3.5	8-9	3.5
9-11	3.0	6-7	3.0
6-8	2.5	4-5	2.5

Question Types

Multiple choice question

This question requires you to pick the correct answer from the given choices A,B,C and D. This type of question tests your ability to understand detailed and specific information.

List Selection

Choose the correct answer from the given list of words, information, or names. Answers are usually A-G, read the instructions carefully to check.

Information identification questions- True/False/Not Given

Identify whether the given information is either true, false or not given. This type of question tests your ability to clearly understand what the text is talking about.

Information matching

Find specific information and place them where they fit to be. You need to have clearly understood the text and be able to understand every paragraph and what information it contains.

Heading Matching

Pick a suitable heading from the given list of headings. Mainly, if you have clearly understood the given text and find the main idea of every paragraph, you'll be able to make a heading out of every paragraph.

Features matching

Find specific information about given features and match it. For example, you can be given different people who discovered different things at different times. You are now required to match who discovered what at what time.

Matching sentence endings

Part of a sentence is picked from a line in the text. You have to locate where it has been taken from in the text and complete the sentence.

Sentence completion

An incomplete sentence is given. You are supposed to complete it with words taken from the text.

Summary completion

A summary part of the text will be given to you. You are required to complete it by picking words from the text with a given maximum number of words to complete it. Sometimes the synonyms of these words are given in a box; you need to choose the correct answer from the box.

Short answer questions

Answer the question from the given facts in the text. Moreover, you need to check the number of words given in the instructions. A maximum number of words is always given.

Global questions - Choosing a title

You need to find the main idea of the passage. A passage that tests this question might not be presented with a title.

Flowchart/Diagram/Table Completion

You need to complete the gaps in a table, diagram or flow chart with the correct words from the passage.

IELTS Reading Tips

1. Don't expect to understand every word

A wide vocabulary is key to getting a good score in the IELTS test, but worrying about all the words you don't understand in the reading exam is one of the worst things you can do.

If you don't understand a word in the reading test you can look at the words and sentences around it for clues - the contextual meaning- or you can move on and forget about it. You don't have to understand the meaning of every word.



2. Practice your reading skills NOT your IELTS skills

It is important to familiarise yourself with the IELTS reading test, IELTS reading tips and gain an understanding of the various questions. However, students who just practice for the IELTS exams are missing out on a good opportunity to improve their general reading skills.

IELTS reading texts can be a little boring and you are more likely to read regularly if you read about something you are interested in. Reading for pleasure a little every day will not only improve your English skills but also improve your vocabulary. There are thousands of blogs, newspapers, magazines, and newspapers to choose from online.



3. Read the instructions VERY carefully

So many easy marks are lost by good IELTS candidates because they fail to read the instructions properly. This is especially true in the reading and listening tests because they give very specific instructions. If you don't follow these instructions exactly, you will get the answer wrong.

For example, the instructions might state 'write two words and/or a number'. This could mean:

One word

A number

One word and a number

Two words

Two words and a number

Even if a number is written as a word it counts as a number e.g. Thirty two is counted as 32. 'Thirty two cars' is one word and a number. If you don't do this, as stated in the instructions, you will lose a point.

If the answer asks for two words only and the answer is red and yellow, you should write 'red, yellow', not 'red and yellow'. 'Red, yellow' are two words. 'Red and yellow' are three and therefore incorrect.

Finally, one word only means just one word. We should, therefore, be very careful with articles like 'a' and 'an'. For example, the text might say 'an earthquake', but if it asks for one word simply write 'earthquake'. 'An earthquake' is two words and is therefore wrong.

4. Don't panic

Some of the questions will be easy and some will be extremely difficult. The key is not to panic when trying to answer a difficult one.

A strategy is to spend a large amount of time on a question and fail to spend enough time on the rest of the questions. If the answer does not present itself, move on to the next. You can always come back to the difficult questions later and also answering the other questions will often help you. Time and nerves need to be controlled in order to do well in the reading test.



5. It's really a vocabulary test

In many ways, the reading test is more of a vocabulary test than a reading test. They will use synonyms and paraphrases to test how wide your vocabulary is. To prepare for this I advise my students to do three things: read, note, and review.

As mentioned in tip number 2, reading is the best way to improve your vocabulary. Memorising lists of words is not as effective as seeing words in context. When you see a new word you don't understand, try to guess the meaning from context. Only when you have done that should you check the meaning.

Next, collate these new words in a vocabulary journal. Record not only the meaning but also synonyms, antonyms, collocations, and examples.

Finally, there is no point in recording all this new vocabulary if you don't review it. So, do review them regularly until you master them.

6. Pacing is crucial

If you spend too much time on one question you will leave less time for the other questions, however, if you try to do the test too quickly you will miss information and may get confused.



7. Ignore anything you already know about the topic

The higher the level the more this problem affects people. Please remember that you are being tested on your understanding of the text only; your own knowledge of the topic should not influence your answers.

8. Be careful when transferring your answers

In the test, you will be asked to transfer your answers to an answer sheet. A common mistake is to spend too much time on reading and answering questions and leaving very little time to transfer the answers. It is only natural that silly mistakes are made when people are under pressure. Using ALL CAPITALS for your answers is always a safe bet!

9. Leave no blanks

Even if you don't know the answer, guess and make sure you answer every question, as there's no negative marking.

In-class Content

Reading Skills required to solve the Questions:

- 1. Skimming** - Skimming is a reading technique meant to look for the main or general ideas in a text, without going into detailed and exhaustive reading. In skimming, a reader reads only important information, but not everything.
- 2. Scanning** - Scanning means quickly searching a passage for a particular word or term (e.g. a name or a date). Skimming means reading quickly without reading every word so that you get an overall impression of a text or part of a text.
- 3. Detailed Reading** - Detailed reading means reading something carefully to get accurate information.
- 4. Deducing meaning of language from context** - To guess the meaning of an unknown word by using the information in a situation and/or around the word to help.
- 5. Paraphrased information** - Paraphrasing is conveying the same meaning using different words.
- 6. Identifying references - Keywords** - To understand how certain words in the text refer to people, things or ideas previously.
- 7. Summarizing** - To extract the main points of a text, and rewrite/ retell them in a short, clear way
- 8. Predicting** - To activate schemata by guessing what the text will be about using clues such as the title, vocabulary, headings

9. Inferring attitude, feeling, mood or purpose - To decide how a writer or speaker feels about something from the way that they speak or write, rather than from what they openly say or the words they use

10. Understanding Graphs & Charts - Interpret data from visual representation

Short Answers

Description:

In this question type a statement will be given in the form of question and you have to answer it as per the instructions given. You should know how to skim, scan, and paraphrase.

Strategy:

- Read the questions first and underline the key words.
- Skim and scan for the answer as per the instructions given.
- Answers will be in passage order.
- Write the exact words from the text.

Exercise 1

A perfectly preserved shoe, 1,000 years older than the Great Pyramid of Giza in Egypt and 400 years older than Stonehenge in the UK. has been found in a cave in Armenia. The 5,500 year old shoe, the oldest leather shoe in the world, was discovered by a team of international archaeologists.

The cow-hide shoe dates back to 3,500 BC (the Chalcolithic period) and is in perfect condition. It was made of a single piece of leather and was shaped to fit the wearer's foot. It contained grass; although the archaeologists were uncertain as to whether this was to keep the foot warm or to maintain the shape of the shoe, a precursor to the modern shoe-tree perhaps? "It is not known whether the shoe belonged to a man or woman," said lead author of the research, Dr Ron Pinhasi, University College Cork, Ireland "as, while small,

(European size 37; US size 7 women), the shoe could well have fitted a man from that era. " The cave is situated in the Vayots Dzor province of Armenia, on the Armenian, Iranian, Nakhichevanian and Turkish borders, and was known to regional archaeologists due to its visibility from the highway below.

The stable, cool and dry conditions in the cave resulted in exceptional preservation of the various objects that were found, which included large containers, many of which held well-preserved wheat and barley, apricots and other edible plants. The preservation was also helped by the fact that the floor of the cave was covered by a thick layer of sheep dung which acted as a solid seal over the objects, preserving them beautifully over the millennia! "We initially thought that the shoe and other objects were about 600-700 years old because they were in such good condition," said Dr Pinhasi. "It was only when the material was dated by the two radiocarbon laboratories in Oxford, UK. and in California, US that we realized that the shoe was older by a few hundred years than the shoes worn by Otzi, the Iceman."

Three samples were taken in order to determine the absolute age of the shoe and all three tests produced the same results. The archaeologists cut two small strips of leather off the shoe and sent one strip to the Oxford Radiocarbon Accelerator Unit at the University of Oxford and another to the University of California - Irvine Accelerator Mass Spectrometry Facility. A piece of grass from the shoe was also sent to Oxford to be dated and both shoe and grass were shown to be the same age.

The shoe was discovered by Armenian PhD student, Ms Diana Zardaryan, of the Institute of Archaeology, Armenia, in a pit that also included a broken pot and wild goat horns." I was amazed to find that even the shoe-laces were preserved, "she recalled." We couldn't believe the discovery, "said Dr Gregory Areshian, Cotsen Institute of Archaeology at UCLA, US, co-director who was at the site with Mr. Boris Gasparyan, co-director, Institute of Archaeology, Armenia when the shoe was found. "The crusts had sealed the artefacts and archaeological deposits and artefacts remained fresh and dried, just like they were put in a can," he said.

The oldest known footwear in the world, to the present time, are sandals made

of plant material, that were found in a cave in the Arnold Research Cave in Missouri in the US. Other contemporaneous sandals were found in the Cave of the Warrior, Judean Desert, Israel, but these were not directly dated, so that their age is based on various other associated artefacts found in the cave.

Interestingly, the shoe is very similar to the 'pampooties' worn on the Aran Islands (in the West of Ireland) up to the 1950s. "In fact, enormous similarities exist between the manufacturing technique and style of this shoe and those found across Europe at later periods, suggesting that this type of shoe was worn for thousands of years across a large and environmentally diverse region," said Dr Pinhasi. "We do not know yet what the shoe or other objects were doing in the cave or what the purpose of the cave was," said Dr Pinhasi. "We know that there are children's graves at the back of the cave but so little is known about this period that we cannot say with any certainty why all these different objects were found together." The team will continue to excavate the many chambers of the cave.

1. How old is the Armenian shoe?
2. What was found in the shoe?
3. What environmental factors protected the shoe?
4. What was the shoe covered with?
5. How old was the shoe originally thought to be?
6. What two things were tested to determine the age of the shoe?
7. Who found the shoe?
8. When did Irish people wear similar shoes?

Source: <https://www.nationalgeographic.com>, *World's Oldest Leather Shoe Found—Stunningly Preserved*

Exercise 2

US Food waste worth more than offshore drilling

Recent estimates suggest that 16 percent of the energy consumed in the US is used to produce food. Yet at least 25 percent of food is wasted each year. Michael Webber and Amanda Cuellar at the Center for International Energy and Environmental Policy at the University of Texas at Austin calculate that this is the equivalent of about 2,150 trillion kilojoules lost each year. That's more than could be gained from many popular strategies to improve energy efficiency. It is also more than projections for how much energy the US could produce by making ethanol biofuel from grains.

Questions-1-2

Answer the Questions below.

Choose **NO MORE THAN THREE WORDS AND/ OR A NUMBER** from the passage for each answer.

1. How much food does the US waste every year?
2. How much energy could be saved annually if food was not wasted?

Source: <https://www.newscientist.com/>, *US Food waste worth more than offshore drilling*

Exercise 3

The Dingo -An Australian Pest

The origins of the dingo are obscure and there is much controversy connected with this. It is not truly native to Australia but is thought to have arrived between 3,500 and 4,000 years ago. Whatever its origins, the dingo was a highly valued companion to the aborigines. They were hunting companions, guard dogs, and they kept them warm at night.

Some believe they were brought here on rafts or boats by the ancestral aborigines. It has also been suggested that they came with Indonesian or South-East Asian fishermen who visited the northern coast of Australia.

The dingo can be found in all areas of Australia - from harsh deserts to lush rainforests. The highly adaptable dingo is found in every habitat and every state of Australia, except Tasmania. In deserts, access to drinking water determines where the animal can live. Pure-bred dingo numbers in the wild are declining as man encroaches deeper and deeper into wilderness areas. often accompanied by his domestic dog.

The dingo is different from the modern dog in several ways: it does not bark, it has a different gait, and its ears are always erect. Dingoes are naturally lean and they are usually cream to reddish-yellow with white points, Some are black with tan points. An adult dingo stands more than 60cm high and weighs about 15kg. It is slightly smaller than a German Shepherd.

In its natural state the dingo lives either alone or in a small group unlike many other wild dog species which may form packs. Dingoes have a clearly defined territory which they rarely leave and which they protect from other dingoes, but which may be shared with other dingoes when they form a group to hunt larger prey. The size of the home territory varies according to the food supply. Dingoes hunt mainly at night. Groups are controlled by a dominant male. Members of a group maintain contact by marking rocks and trees within their territory, and by howling, particularly in the breeding season.

The dingo's diet consists of native mammals, including kangaroos, although domestic animals and some farm stock are also on the menu. This makes the animal unpopular with farmers. The dingo is thought to have contributed to the mainland extinction of the thylacine (Tasmanian tiger) through increased competition for food.

The dingo is an intelligent animal. It is no more dangerous to man than any other feral dog. The natural prey of the dingo is small mammals and ground-dwelling birds, but with the introduction of white settlement, they became such a menace to sheep, calves and poultry that measures had to be taken in an attempt to control them, such as "dog-proof fences".

Dingoes start breeding when they reach the age of one or two but only the dominant members within an established group breed. They breed only once a year. Mating usually occurs in autumn/early winter and after a gestation of nine

weeks (same as domestic dogs) a litter averaging 4-5 pups is born, which are reared in a hollow log, a rock-shelter, or an old rabbit warren. Both parents take part in raising the pups. The pups are fully grown at seven months of age. A dingo may live for up to ten years.

Wild dingoes are wary of humans and do not attack unless provoked. They will approach camps in the bush looking for food or perhaps out of curiosity. Dingoes can be kept as pets but should be obtained at a very young age to enable them to bond with humans. Even when raised from pups they never seem to lose their instinct for killing poultry or small animals. Not all states in Australia allow dingoes to be kept as pets and a permit is required. The export of dingoes is illegal.

Dingoes are domestic dogs interbreed freely resulting in very few pure-bred dingoes in southern or eastern Australia. This threatens the dingo's ability to survive as a separate species. Public hostility is another threat to the dingo. Because it takes some livestock, the dingo is considered by many to be a pest.

Questions 1 - 8 Answer the questions below. Choose **NO MORE THAN THREE WORDS AND/OR A NUMBER** from the passage for each answer

1. Who might have introduced the dingo into the country?
2. What main factor decides where the dingo can live in a desert?
3. In what three ways is a dingo different from a domesticated dog?
4. What determines how big an area they live in?
5. What animal might the dingo have helped wipe out?
6. What is the life expectancy of a dingo?
7. When is it better to have a dingo as a pet?
8. Many people are very angry because they regard the dingo as what?

Source: <https://www.newscientist.com/>, *Dingoes are both pest and icon*

Exercise 4

The Northern Lights

The connection between the Northern Lights and sunspot activity has been suspected since about 1880. Thanks to research conducted since the 1950's, we now know that electrons and protons from the sun are blown towards the earth on the 'solar wind'. 1957 -58 was International Geophysical Year and the atmosphere was studied extensively with balloons, radar, rockets and satellites. Rocket research is still conducted by scientists at Poker Flats, a facility under the direction of the University of Alaska at Fairbanks.

Questions 1 -2

Answer the questions below.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

1. We can infer from the passage that sunspot activity releases what?
2. What was investigated using a variety of methods?

Source: <https://en.wikipedia.org/>, *Aurora*

Practice Exercises

Practice 1

William Henry Perkin

William Henry Perkin was born on March 12, 1838, in London, England. As a boy, Perkin's curiosity prompted early interests in the arts, sciences, photography, and engineering. But it was a chance stumbling upon a run-down, yet functional, laboratory in his late grandfather's home that solidified the young man's enthusiasm for chemistry.

As a student at the City of London School, Perkin became immersed in the study of chemistry. His talent and devotion to the subject were perceived by his teacher, Thomas Hall, who encouraged him to attend a series of lectures

given by the eminent scientist Michael Faraday at the Royal Institution. Those speeches tired the young chemist's enthusiasm further, and he later went on to attend the Royal College of Chemistry, which he succeeded in entering in 1853, at the age of 15.

At the time of Perkin's enrollment, the Royal College of Chemistry was headed by the noted German chemist August Wilhelm Hofmann. Perkin's scientific gifts soon caught Hofmann's attention and within two years, he became Hofmann's youngest assistant. Not long after that, Perkin made the scientific breakthrough that would bring him both fame and fortune.

At the time, quinine was the only viable medical treatment for malaria. The drug is derived from the bark of the cinchona tree, native to South America and by 1856 demand for the drug was surpassing the available supply. Thus, when Hofmann made some passing comments about the desirability of a synthetic substitute for quinine, it was unsurprising that his star pupil was moved to take up the challenge.

During his vacation in 1856, Perkin spent his time in the laboratory on the top floor of his family's house. He was attempting to manufacture quinine from aniline, an inexpensive and readily available coal tar waste product. Despite his best efforts, however, he did not end up with quinine. Instead, he produced a mysterious dark sludge. Luckily, Perkins' scientific training and nature prompted him to investigate the substance further. Incorporating potassium dichromate and alcohol into the aniline at various stages of the experimental process, he finally produced a deep purple solution. And, proving the truth of the famous scientist Louis Pasteur's words 'chance favors only the prepared mind'. Perkin saw the potential of his unexpected find.

Historically, textile dyes were made from such natural sources as plants and animal excretions. Some of these, such as the glandular mucus of snails, were difficult to obtain and outrageously expensive. Indeed, the purple colour extracted from a snail was once so costly that in society at the time only the rich could afford it. Further, natural dyes tended to be muddy in hue and fade quickly. It was against this backdrop that Perkin's discovery was made.

Perkin quickly grasped that his purple solution could be used to colour fabric, thus making it the world's first synthetic dye. Realising the importance of this breakthrough, he lost no time in patenting it. But perhaps the most fascinating of all Perkin's reactions to his find was his nearly instant recognition that the new dye had commercial possibilities.

Perkin originally named his dye Tyrian Purple, but it later became commonly known as mauve (from the French for the plant used to make the colour violet). He asked advice of Scottish dye works owner Robert Pullar, who assured him that manufacturing the dye would be well worth it if the colour remained fast (i.e. would not fade) and the cost was relatively low. So, over the fierce objections of his mentor Hofmann, he left college to give birth to the modern chemical industry.

With the help of his father and brother, Perkin set up a factory not far from London. Utilizing the cheap and plentiful coal tar that was an almost unlimited byproduct of London's gas street lighting, the dye works began producing the world's first synthetically dyed material in 1857. The company received a commercial boost from the Empress Eugenie of France, when she decided the new color flattered her. Very soon, mauve was the necessary shade for all the fashionable ladies in that country.

Not to be outdone, England's Queen Victoria also appeared in public wearing a mauve gown, thus making it all the rage in England as well. The dye was bold and fast, and the public clamour for more. Perkin went back to the drawing board.

Although Perkins' fame was achieved and fortune assured by his first discovery, the chemist continued his research. Among other dyes he developed and introduced were aniline red (1859) and aniline black (1863) and in the late 1860s, Perkin's green. It is important to note that Perkin's synthetic dye discoveries had outcomes far beyond the merely decorative. The dyes also became vital to medical research in many ways. For instance, they were used to stain previously invisible microbes and bacteria, allowing researchers to identify such bacilli as tuberculosis, cholera, and anthrax. Artificial dyes continue to play a crucial role today. And, in what would have been particularly pleasing to Perkin, their current use is in the search for a vaccine against malaria

Question 8-13

Answer the Questions below:

Choose **NO MORE THAN TWO WORDS** from the passage for each answer

Write your answers in boxes 8-13 on your answer sheet.

8. Before Perkin's discovery, with what group in society was the colour purple associated?
9. What potential did Perkin immediately understand that his new dye had?
10. What was the name finally used to refer to the first color Perkin invented?
11. What was the name of the person Perkin consulted before setting up his own dye works?
12. In what country did Perkins' newly invented colour first become fashionable?
13. According to the passage, which disease is now being targeted by researchers using synthetic dyes?

Explanation for Q8 :-

APPLY THE TIPS AS TAUGHT ABOVE:

8. Keywords: what group, purple associated?

In paragraph 6, the writer argues that "Indeed, the purple colour extracted from a snail was once so costly that in society at the time, only the rich could afford it." So, before Perkin's discovery, the colour purple was associated with the rich.

=>ANSWER: THE RICH

Source : Cambridge Book 9

Practice 2

IS THERE ANYBODY OUT THERE?

The Search for Extraterrestrial Intelligence

The question of whether we are alone in the Universe has haunted humanity for centuries, but we may now stand poised on the brink of the answer to that question, as we search for radio signals from other intelligent civilizations. This search, often known by the acronym SETI (search for extraterrestrial intelligence), is a difficult one. Although groups around the world have been searching intermittently for three decades, it is only now that we have reached the level of technology where we can make a determined attempt to search all nearby stars for any sign of life.

A

The primary reason for the search is basic curiosity - the same curiosity about the natural world that drives all pure science. We want to know whether we are alone in the Universe. We want to know whether life evolves naturally if given the right conditions, or whether there is something very special about the Earth to have fostered the variety of life forms that we see around us on the planet. The simple detection of a radio signal will be sufficient to answer this most basic of all questions. In this sense, SETI is another cog in the machinery of pure science which is continually pushing out the horizon of our knowledge. However, there are other reasons for being interested in whether life exists elsewhere. For example, we have had civilization on Earth for perhaps only a few thousand years , and the threats of nuclear war and pollution over the last few decades have told us that our survival may be tenuous. Will we last another two thousand years or will we wipe ourselves out? Since the lifetime of a planet like ours is several billion years, we can expect that if other civilizations do survive in our galaxy, their ages will range from zero to several billion years. Thus any other civilization that we hear from is likely to be far older on average than ourselves. The mere existence of such a civilization will tell us that long - term survival is possible, and gives us some cause for optimism. It is even possible that the older civilization may pass on the benefits of their experience in dealing with threats to survival such as nuclear war and global pollution, and other threats that we haven't yet discovered.

B

In discussing whether we are alone, most SETI scientists adopt two ground rules. First, UFOs (Unidentified Flying objects) are generally ignored since most scientists don't consider the evidence for them to be strong enough to bear serious consideration (although it is also important to keep an open mind in case any really convincing evidence emerges in the future). Second, we make a very conservative assumption that we are mind looking for a life form that is pretty well like us, since if it differs radically from us we may well not recognize it as a life form, quite apart from whatever we are able to communicate with it. In other words, the life form we are looking for may well have two green heads and seven fingers, but it will nevertheless resemble us in that it should communicate with its fellows. Be interested in the Universe, Live on a planet orbiting a star like our Sun, and perhaps most restrictively have chemistry, like us, based on carbon and water.

C

Even when we make these assumptions, our understanding of other life forms is still severely limited. We do not even know, for example, how many stars have planets, and we certainly do not know how likely it is that life will arise naturally, given the right conditions. However, when we look at the 100 billion stars in our galaxy (the Milky Way), and 100 billion galaxies. In the observable Universe, it seems inconceivable that at least one of these planets does not have a life form on it; in fact, the best - educated guess we can make using the little that we do know about the conditions for carbon - based life, leads us to estimate that perhaps one in 100,000 stars might have a life - bearing planet orbiting it. That means that our nearest neighbours are perhaps 1000 light years away, which is almost next door in astronomical terms.

D

An alien civilization could choose many different ways of sending information across the galaxy, but many of these either require too much energy, or else are severely attenuated while traversing the vast distances across the galaxy. It turns out that for a given amount of transmitted power : radio waves in the frequency range 1000 to 3000 MHz travel the greatest distance, and so all searches to date

have concentrated on looking for radio waves in this frequency range. So far there have been a number of searches by various groups around the world, including Australian searches using the radio telescope at Parkes, New South Wales. Until now there have not been any detections from the few hundred stars which have been searched. The scale of the searches has increased dramatically since 1992 when the US Congress voted NASA \$10 million per year for ten years to conduct a thorough search for extra - terrestrial life. Much of the money in this project is being spent on developing the special hardware needed to search many frequencies at once. The project has two parts. One part is a targeted search using the world's largest radio telescopes. The American - operated telescope in Arecibo. Puerto Rico and the French telescope in Nancy in France. This part of the project is searching the nearest 1000 likely stars with a high sensibility for signals in the frequency range 1000 to 3000 MHz. The other part of the project is an undirected search which is monitoring all of the space with a lower sensitivity, using the smaller antennas of NASA's Deep Space Network.

E

There is considerable debate over how we should react if we detect a signal from an alien civilization. Everybody agrees that we should not reply immediately. Quite apart from the impracticality of sending a reply over such large distances at short notice, it raises a host of ethical questions that would have to be addressed by the global community before any reply could be sent. Would the human race face culture shock if faced with a superior and much older civilization? Luckily there is no urgency about this. The stars being searched are hundreds of light-years away, so it takes hundreds of years for their signal to reach us, and a further few hundred years for our reply to reach them. It is not important, then, if there's a delay of a few years, or decades, while the human race debates the question of whether to reply and perhaps carefully drafts a reply.

Question 18-20

Choose **NO MORE THAN THREE WORDS AND/ OR A NUMBER** from the passage for each answer.

Write your answers in boxes 18-20 on your answer sheet.

19. What kind of signals from other intelligent civilizations are SETI scientists searching for?
20. How many stars are the world's most powerful radio telescopes searching?

Source : Cambridge Book 9

Practice 3

The history of the tortoise

If you go back far enough, everything lived in the sea. At various points in evolutionary history, enterprising individuals within many different animal groups moved out onto the land, sometimes even to the most parched deserts, taking their own private seawater with them in blood and cellular fluids. In addition to the reptiles, birds, mammals and insects which we see all around us, other groups that have succeeded out of water include scorpions, snails, crustaceans such as woodlice and land crabs, millipedes and centipedes, spiders and various worms. And we mustn't forget the plants, without whose prior invasion of the land none of the other migrations could have happened.

Moving from water to land involved a major redesign of every aspect of life, including breathing and reproduction. Nevertheless, a good number of thoroughgoing land animals later turned around, abandoned their hard-earned terrestrial re-tooling, and returned to the water again. Seals have only gone part way back. They show us what the intermediates might have been like, on the way to extreme cases such as whales and dugongs. Whales (including the small whales we call dolphins) and dugongs, with their close cousins the manatees, ceased to be land creatures altogether and reverted to the full marine habits of

their remote ancestors. They don't even come ashore to breed. They do, however, still breathe air, having never developed anything equivalent to the gills of their earlier marine incarnation. Turtles went back to the sea a very long time ago and, like all vertebrate returnees to the water, they breathe air. However, they are, in one respect, less fully given back to the water than whales or dugongs, for turtles still lay their eggs on beaches.

There is evidence that all modern turtles are descended from a terrestrial ancestor which lived before most of the dinosaurs. There are two key fossils called *Proganochelys quenstedti* and *Palaeochersis talampayensis* dating from early dinosaur times, which appear to be close to the ancestry of all modern turtles and tortoises. You might wonder how we can tell whether fossil animals lived on land or in water, especially if only fragments are found. Sometimes it's obvious. Ichthyosaurs were reptilian contemporaries of the dinosaurs, with fins and streamlined bodies. The fossils look like dolphins and they surely lived like dolphins, in the water. With turtles it is a little less obvious. One way to tell is by measuring the bones of their forelimbs.

Walter Joyce and Jacques Gauthier, at Yale University, obtained three measurements in these particular bones

of 71 species of living turtles and tortoises. They used a kind of triangular graph paper to plot the three measurements against one another. All the land tortoise species formed a tight cluster of points in the upper part of the triangle; all the water turtles cluster in the lower part of the triangular graph. There was no overlap, except when they added some species that spend time both in water and on land. Sure enough, these amphibious species show up on the triangular graph approximately half way between the 'wet cluster' of sea turtles and the 'dry cluster' of land tortoises. The next step was to determine where the fossils fell. The bones of *P. quenstedti* and *P. talampayensis* leave us in no doubt. Their points on the graph are right in the thick of the dry cluster. Both these fossils were dry-land tortoises. They come from the era before our turtles returned to the water.

You might think, therefore, that modern land tortoises have probably stayed on land ever since those early terrestrial times, as most mammals did after a few of them went back to the sea. But apparently

not. If you draw out the family tree of all modern turtles and tortoises, nearly all the branches are aquatic. Today's land tortoises constitute a single branch, deeply nested among branches consisting of aquatic turtles. This suggests that modern land tortoises have not stayed on land continuously since the time of *P. quenstedti* and *P. talampayensis*. Rather, their ancestors were among those who went back to the water, and they then re-emerged back onto the land in (relatively) more recent times.

Tortoises therefore represent a remarkable double return. In common with all mammals, reptiles and birds, their remote ancestors were marine fish and before that various more or less worm-like creatures stretching back, still in the sea, to the primeval bacteria. Later ancestors lived on land and stayed there for a very large number of generations. Later ancestors still evolved back into the water and became sea turtles. And finally they returned yet again to the land as tortoises, some of which now live in the driest of deserts.

Questions 27–30

Answer the questions below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 27–30 on your answer sheet.

- 27 What had to transfer from sea to land before any animals could migrate?
- 28 Which **TWO** processes are mentioned as those in which animals had to make big changes as they moved onto land?
- 29 Which physical feature, possessed by their ancestors, do whales lack?
- 30 Which animals might ichthyosaurs have resembled?

Source : Cambridge Book 9

Practice 4

Hearing Impairment

- A** Hearing impairment or other auditory function deficit in young children can have a major impact on their development of speech and communication, resulting in a detrimental effect on their ability to learn at school. This is likely to have major consequences for the individual and the population as a whole. The New Zealand Ministry of Health has found from research carried out over two decades that 6–10% of children in that country are affected by hearing loss.
- B** A preliminary study in New Zealand has shown that classroom noise presents a major concern for teachers and pupils. Modern teaching practices, the organisation of desks in the classroom, poor classroom acoustics, and mechanical means of ventilation such as air-conditioning units all contribute to the number of children unable to comprehend the teacher's voice. Education researchers Nelson and Soli have also suggested that recent trends in learning often involve collaborative interaction of multiple minds and tools as much as individual possession of information. This all amounts to heightened activity and noise levels, which have the potential to be particularly serious for children experiencing auditory function deficit. Noise in classrooms can only exacerbate their difficulty in comprehending and processing verbal communication with other children and instructions from the teacher.
- C** Children with auditory function deficit are potentially failing to learn to their maximum potential because of noise levels generated in classrooms. The effects of noise on the ability of children to learn effectively in typical classroom environments are now the subject of increasing concern. The International Institute of Noise Control Engineering (I-INCE), on the advice of the World Health Organization, has established an international working party, which includes New Zealand, to evaluate noise and reverberation control for school rooms.
- D** While the detrimental effects of noise in classroom situations are not limited to children experiencing disability, those with a disability that affects their processing of speech and verbal communication could be extremely vulnerable. The auditory function deficits in question include hearing impairment, autistic spectrum disorders (ASD) and attention deficit disorders (ADD/ADHD).
- E** Autism is considered a neurological and genetic life-long disorder that causes discrepancies in the way information is processed. This disorder is characterised by interlinking problems with social imagination, social communication and social interaction. According to Janzen, this affects the ability to understand and relate in typical ways to people, understand events and objects in the environment, and understand or respond to sensory stimuli. Autism does not allow learning or thinking in the same ways as in children who are developing normally.

Autistic spectrum disorders often result in major difficulties in comprehending verbal information and speech processing. Those experiencing these disorders often find sounds such as crowd noise and the noise generated by machinery painful and distressing. This is difficult to scientifically quantify as such extra-sensory stimuli vary greatly from one autistic individual to another. But a child who finds any type of noise in their classroom or learning space intrusive is likely to be adversely affected in their ability to process information.

- F** The attention deficit disorders are indicative of neurological and genetic disorders and are characterised by difficulties with sustaining attention, effort and persistence, organisation skills and disinhibition. Children experiencing these disorders find it difficult to screen out unimportant information, and focus on everything in the environment rather than attending to a single activity. Background noise in the classroom becomes a major distraction, which can affect their ability to concentrate.
- G** Children experiencing an auditory function deficit can often find speech and communication very difficult to isolate and process when set against high levels of background noise. These levels come from outside activities that penetrate the classroom structure, from teaching activities, and other noise generated inside, which can be exacerbated by room reverberation. Strategies are needed to obtain the optimum classroom construction and perhaps a change in classroom culture and methods of teaching. In particular, the effects of noisy classrooms and activities on those experiencing disabilities in the form of auditory function deficit need thorough investigation. It is probable that many undiagnosed children exist in the education system with 'invisible' disabilities. Their needs are less likely to be met than those of children with known disabilities.
- H** The New Zealand Government has developed a New Zealand Disability Strategy and has embarked on a wide-ranging consultation process. The strategy recognises that people experiencing disability face significant barriers in achieving a full quality of life in areas such as attitude, education, employment and access to services. Objective 3 of the New Zealand Disability Strategy is to 'Provide the Best Education for Disabled People' by improving education so that all children, youth learners and adult learners will have equal opportunities to learn and develop within their already existing local school. For a successful education, the learning environment is vitally significant, so any effort to improve this is likely to be of great benefit to all children, but especially to those with auditory function disabilities.
- I** A number of countries are already in the process of formulating their own standards for the control and reduction of classroom noise. New Zealand will probably follow their example. The literature to date on noise in school rooms appears to focus on the effects on schoolchildren in general, their teachers and the hearing impaired. Only limited attention appears to have been given to those students experiencing the other disabilities involving auditory function deficit. It is imperative that the needs of these children are taken into account in the setting of appropriate international standards to be promulgated in future.

Questions 7–10

Answer the questions below.

Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage for each answer.

Write your answers in boxes 7–10 on your answer sheet.

- 7** For what period of time has hearing loss in schoolchildren been studied in New Zealand?

- 8 In addition to machinery noise, what other type of noise can upset children with autism?
- 9 What term is used to describe the hearing problems of schoolchildren which have not been diagnosed?
- 10 What part of the New Zealand Disability Strategy aims to give schoolchildren equal opportunity?

Source : Cambridge Book 9

Practice 5

Stepwells

A millennium ago, stepwells were fundamental to life in the driest parts of India. Although many have been neglected, recent restoration has returned them to their former glory. Richard Cox travelled to north-western India to document these spectacular monuments from a bygone era.

During the sixth and seventh centuries, the inhabitants of the modern-day states of Gujarat and Rajasthan in North-western India developed a method of gaining access to clean, fresh groundwater during the dry season for drinking, bathing, watering animals and irrigation. However, the significance of this invention – the stepwell – goes beyond its utilitarian application.

Unique to the region, stepwells are often architecturally complex and vary widely in size and shape. During their heyday, they were places of gathering, of leisure, of relaxation and of worship for villagers of all but the lowest castes. Most stepwells are found dotted around the desert areas of Gujarat (where they are called vav) and Rajasthan (where they are known as baori), while a few also survive in Delhi. Some were located in or near villages as public spaces for the community; others were positioned beside roads as resting places for travellers. As their name suggests, stepwells comprise a series of stone steps descending from ground level to the water source (normally an underground aquifer) as it recedes following the rains. When the water level was high, the user needed only to descend a few steps to reach it; when it was low, several levels would have to be negotiated.

Some wells are vast, open craters with hundreds of steps paving each sloping side, often in tiers. Others are more elaborate, with long stepped passages leading to the water via several storeys built from stone and supported by pillars; they also included pavilions that sheltered visitors from the relentless heat. But perhaps the most impressive features are the intricate decorative sculptures that embellish many stepwells, showing activities from fighting and dancing to everyday acts such as women combing their hair and churning butter.

Down the centuries, thousands of wells were constructed throughout northwestern India, but the majority have now fallen into disuse; many are derelict and dry, as groundwater has been diverted for industrial use and the wells no longer reach the water table. Their condition hasn't been helped by recent dry spells: southern Rajasthan suffered an eight-year drought between 1996 and 2004.

However, some important sites in Gujarat have recently undergone major restoration, and the state government announced in June last year that it plans to restore the stepwells throughout the state.

In Patan, the state's ancient capital, the stepwell of Rani Ki Vav (Queen's Stepwell) is perhaps the finest current example. It was built by Queen Udayamati during the late 11th century, but became silted up following a flood during the 13th century. But the Archaeological Survey of India began restoring it in the 1960s, and today it's in pristine condition. At 65 metres long, 20 metres wide and 27 metres deep, Rani Ki Vav features 500 distinct sculptures carved into niches throughout the monument, depicting gods such as Vishnu and Parvati in various incarnations. Incredibly, in January 2001, this ancient structure survived a devastating earthquake that measured 7.6 on the Richter scale.

Another example is the Surya Kund in Modhera, northern Gujarat, next to the Sun Temple, built by King Bhima I in 1026 to honour the sun god Surya. It's actually a tank (kund means reservoir or pond) rather than a well, but displays the hallmarks of stepwell architecture, including four sides of steps that descend to the bottom in a stunning geometrical formation. The terraces house 108 small, intricately carved shrines between the sets of steps.

Rajasthan also has a wealth of wells. The ancient city of Bundi, 200 kilometres south of Jaipur, is renowned for its architecture, including its stepwells. One of the larger examples is Rani Ki Baori, which was built by the queen of the region, Nathavatji, in 1699. At 46 metres deep, 20 metres wide and 40 metres long, the intricately carved monument is one of 21 baoris commissioned in the Bundi area by Nathavatji.

In the old ruined town of Abhaneri, about 95 kilometres east of Jaipur, is Chand Baori, one of India's oldest and deepest wells; aesthetically, it's perhaps one of the most dramatic. Built in around 850 AD next to the temple of Harshat Mata, the baori comprises hundreds of zigzagging steps that run along three of its sides, steeply descending 11 storeys, resulting in a striking geometric pattern when seen from afar. On the fourth side, covered verandas supported by ornate pillars overlook the steps.

Still in public use is Neemrana Ki Baori, located just off the Jaipur–Delhi highway. Constructed in around 1700, it's nine storeys deep, with the last two levels underwater. At ground level, there are 86 colonnaded openings from where the visitor descends 170 steps to the deepest water source.

Today, following years of neglect, many of these monuments to medieval engineering have been saved by the Archaeological Survey of India, which has recognised the importance of preserving them as part of the country's rich history. Tourists flock to wells in far-flung corners of northwestern India to gaze in wonder at these architectural marvels from 1,000 years ago, which serve as a reminder of both the ingenuity and artistry of ancient civilisations and of the value of water to human existence.

Questions 6 - 8

Answer the questions below.

Choose ONE WORD ONLY from the passage for each answer.

Write your answers in boxes 6–8 on your answer sheet.

6. Which part of some stepwells provided shade for people?
7. What type of serious climatic event, which took place in southern Rajasthan, is mentioned in the article?
8. Who are frequent visitors to stepwells nowadays?

Source : Cambridge Book 10

Practice 6

The Iron Bridge

The Iron Bridge was the first of its kind in Europe and is universally recognised as a symbol of the Industrial Revolution.

(A) The Iron Bridge crosses the River Severn in Coalbrookdale, in the west of England. It was the first cast-iron bridge to be successfully erected, and the first large cast-iron structure of the industrial age in Europe, although the Chinese were expert iron-casters many centuries earlier.

(B) Rivers used to be the equivalent of today's motorways, in that they were extensively used for transportation. The River Severn, which starts its life on the Welsh mountains and eventually enters the sea between Cardiff and Bristol, is the longest navigable river in Britain. It was ideal for transportation purposes, and special boats were built to navigate the waters. By the middle of the eighteenth century, the Severn was one of the busiest rivers in Europe. Local goods, including coal, iron products, wool, grain and cider, were sent by the river. Among the goods coming upstream were luxuries such as sugar, tea, coffee and wine. In places, the riverbanks were lined with wharves and the river was often crowded with boats loading or unloading.

(C) In 1638, Basil Brooke patented a steel-making process and built a furnace at Coalbrookdale. This later became the property of Abraham Darby (referred to as Abraham Darby I to distinguish him from his son and grandson of the same name). After serving an apprenticeship in Birmingham, Darby had started a business in Bristol, but he moved to Coalbrookdale in 1710 with an idea that coke derived from coal could provide a more economical alternative to charcoal as a fuel for ironmaking. This led to cheaper, more efficient ironmaking from the abundant supplies of coal, iron and limestone in the area.

(D) His son, Abraham Darby II, pioneered the manufacture of cast iron, and had the idea of building a bridge over the Severn, as ferrying stores of all kinds across the river, particularly the large quantities of fuel for the furnaces at Coalbrookdale and other surrounding ironworks, involved considerable expense

and delay. However, it was his son Abraham Darby III (born in 1750) who, in 1775, organised a meeting to plan the building of a bridge. This was designed by a local architect, Thomas Pritchard, who had the idea of constructing it out of iron.

(E) Sections were cast during the winter of 1778-9 for a 7-metre-wide bridge with a span of 31 metres, 12 metres above the river. Construction took three months during the summer of 1779, and remarkably, nobody was injured during the construction process – a feat almost unheard of even in modern major civil engineering projects. Work on the approach roads continued for another two years, and the bridge was opened to traffic in 1781. Abraham Darby III funded the bridge by commissioning paintings and engravings, but he lost a lot on the project, which had cost nearly double the estimate, and he died leaving massive debts in 1789, aged only 39. The district did not flourish for much longer, and during the nineteenth and early twentieth centuries, factories closed down. Since 1934 the bridge has been open only to pedestrians. Universally recognised as the symbol of the Industrial Revolution, the Iron Bridge now stands at the heart of the Ironbridge Gorge World Heritage Site.

(F) It has always been a mystery how the bridge was built. Despite its pioneering technology, no eye-witness accounts are known which describe the iron bridge being erected – and certainly, no plans have survived. However, recent discoveries, research and experiments have shed new light on exactly how it was built, challenging the assumptions of recent decades. In 1997 a small watercolour sketch by Elias Martin came to light in the Swedish capital, Stockholm. Although there is a wealth of early views of the bridge by numerous artists, this is the only one which actually shows it under construction.

(G) Up until recently, it had been assumed that the bridge had been built from both banks, with the inner supports tilted across the river. This would have allowed river traffic to continue unimpeded during construction. But the picture clearly shows sections of the bridge being raised from a barge in the river. It contradicted everything historians had assumed about the bridge, and it was even considered that the picture could have been a fake as no other had come to light. So in 2001, a half-scale model of the bridge was built, in order to see if it could have been constructed in the way depicted in the watercolour. Meanwhile,

a detailed archaeological, historical and photographic survey was done by the Ironbridge Gorge Museum Trust, along with a 3D CAD (computer-aided design) model by English Heritage.

(H) The results tell us a lot more about how the bridge was built. We now know that all the large castings were made individually as they are all slightly different. The bridge wasn't welded or bolted together as metal bridges are these days. Instead it was fitted together using a complex system of joints normally used for wood – but this was the traditional way in which iron structures were joined at the time. The construction of the model proved that the painting shows a very realistic method of constructing the bridge that could work and was in all probability the method used.

(I) Now only one mystery remains in the Iron Bridge story. The Swedish watercolour sketch had apparently been torn from a book which would have contained similar sketches. It had been drawn by a Swedish artist who lived in London for 12 years and travelled Britain drawing what he saw. Nobody knows what has happened to the rest of the book, but perhaps the other sketches still exist somewhere. If they are ever found they could provide further valuable evidence of how the Iron Bridge was constructed.

Answer the questions below

Choose ONE NUMBER ONLY from the text for each answer

Write your answers in boxes 28-31 on your answer sheet

- 28. When was the furnace bought by Darby originally constructed?
- 29. When were the roads leading to the bridge completed?
- 30. When was the bridge closed to traffic?
- 31. When was a model of the bridge built?

Source : Cambridge Book 7

Practice 7

Such a Fascinating Game

It is one of the world's most popular games, played by millions of people at home, in clubs, online, by correspondence, and in tournaments. It is chess, a humble arrangement where two players stare at a checkerboard with 64 squares arranged in an eight-by-eight grid, eyeing their 16 pieces each as the first move is played. When the opponent's king is checkmated, the game is over, but between the beginning and the end, a wealth of elegant, complicated, and fascinating moves and combinations can unfold.

The origins of chess lie in Northwest India, around the 6th century. At that time there existed a game known as caturanga, which means 'four divisions', those divisions being of the military, represented by the infantry, cavalry, elephants, and chariotry. These pieces were eventually to become the pawn, knight, bishop, and rook, respectively, in the modern descendant of the game. Around 600 AD, caturanga spread to Persia, then, after the Muslim conquest of that region (beginning around that time), the game gained ground throughout the Islamic world, from where it eventually spread to Europe.

Around 1200 AD, Southern Europe began modifying the rules, and within 300 years the game had become recognisably the one we play today. The queen had long replaced the earlier vizier to become the most powerful piece, while the pawns were given the option of advancing two squares on the first move in order to accelerate play. These new rules quickly spread across Western Europe, creating the game now known as 'western chess' or 'international chess', to distinguish it from older or regional variants of the game.

As for the players themselves, one world thinks that the best of them are necessarily smart, with extremely high IQs; however, research has not been able to confirm this link. Some studies have shown that good chess players may have strong IQs, but there appears to be no direct correlation between this and chess ability. Paradoxically, the academically brilliant may even be less able at chess, and vice versa. Evidently, there are other factors involved, such as spacio-visual insight and subliminal memory, not necessarily picked up by conventional intelligence tests, readily noticeable, or even useful in real life.

But there are non-mental factors which clearly play a role. No one can doubt that raw talent is necessary, but even the best and brightest must systematically undergo at least 10 to 15 years of theoretical study and competitive practice before reaching world championship levels. The American chess genius, Bobby Fischer, was only 13 when he produced the 'Game of the Century', but he was not world champion until he was 29. The Russian chess player, Garry Kasparov, was the youngest world champion ever, at 22, but he began dedicated state-sponsored training from the age of ten onwards, complete with personal chess coaches.

All this shows the fixed place chess has in western culture, meaning also that this region has, historically, produced all the greatest players. However, interest in chess is now growing in the East, although there is one problem being the stiff competition it faces with local board games, such as Xiangqi and Go. These are more popular by a wide margin, but regarding China for example, with its huge population and state-sponsored training, it is fast becoming a major chess power. The reigning women's world chess champion is Chinese, and the country performs well in chess Olympiads. The future for the game in this country looks bright indeed.

Talking about the future inevitably leads to the subject of computer chess. Serious chess-playing machines began to emerge in the 1970s and 1980s, but their abilities were far below that of the top human players. Progress, although slow, was steady, and with increasing memory and faster processing, it was inevitable that one day a computer would be able to match humans. Yet this is merely by brutally going through all the possible moves, millions per second, deeper and deeper into the position. The final move-choices give the appearance of intuition and long-term strategy, when in actual fact they are simply based on an unthinking and directionless material count.

In 1989, the computer 'Deep Thought' scored some wins against top human players, although the world champion at that time, Garry Kasparov, easily defeated the machine in some arranged games. In 1996, however, IBM brought out the next generation computer, 'Deep Blue', Pitting it in a match with this same player. Although it managed to score the first win against a reigning world champion, by losing three and drawing two of the remaining

games, it lost the match. However, a return match the following year saw Kasparov facing an even better machine, 'Deeper Blue'. This time, the computer triumphed 3 1/2 - 2 1/2. And they are only getting better.

As impressive as these results seem, most people agree that it is similar to a forklift beating a weightlifter - somehow not a valid contest, and of little significance. Yes, computers can win games, but creativity and intelligence are still the province of human players. It is these factors, as well as the tense psychological struggle of minds and the personalities involved, together with the limitless artistry of the positions themselves, which will always make chess such a fascinating game.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

17. Which piece replaced the elephant?
18. Why were pawns given an extra ability?
19. Who was the youngest world champion?

Source: <http://ieltsionlinetests.com/>, *Such a Fascinating Game*

Practice 8

OUT OF THE ASHES

A On the afternoon of 30th August 1989, fire broke out at Uppark, a large eighteenth-century house in Sussex. For a year builders had been replacing the lead on the roof, and by a stroke of irony, were due to finish the next day, on August 31st. Within fifteen minutes of the alarm being sounded, the fire brigade had arrived on the scene, though nothing was to survive of the priceless collection on the first floor apart from an oil painting of a dog which the firemen swept up as they finally retreated from the blaze. But due to the courage and swift action of the previous owners, the Meade-Featherstonhaugh family, and the staff, stewards and visitors to the house, who formed human chains to pass the precious pieces of porcelain, furniture and paintings out on to the lawn, 95 per cent of the contents from the ground floor and the basement were saved. As the fire continued to rage, the National Trust's conservators were being mobilised, and that evening local stationers were especially opened to provide the bulk supplies of blotting paper so desperately needed in the salvage operation.

B The following morning, Uppark stood open to the sky. A sludge of wet charcoal covered the ground floor and basement, and in every room charred and fallen timbers lay amongst the smoke. It was a scene of utter devastation.

C After the initial sense of shock, the days which followed the fire were filled with discoveries. Helped by volunteers, the National Trust's archaeologists and conservators swung into action, first of all marking the site out into a grid and then salvaging everything down to the last door handle. The position of each fragment was recorded, and all the debris was stored in countless dustbins before being sifted and categorised.

D There was great excitement as remnants of the lantern from the Staircase Hall were pulled out from the debris of two fallen floors, and also three weeks later when the Red Room carpet, thought to have been totally lost, was found wrapped around the remains of a piano. There was a lucky reprieve for the State Bed too. Staff who had left the scene at 3am on the night of the fire had thought its loss was inevitable, but when they returned the next morning it had escaped largely undamaged. Firemen, directed by the National Trust's conservators from outside the Tapestry Room window, dismantled the silk-hung bed and passed it out piece by piece. Twenty minutes later the ceiling fell in.

E The scale of the task to repair Uppark was unprecedented in the National Trust. The immediate question was whether it should be done at all. A decision had to be

taken quickly, as the building was unsound and whatever had not been damaged by the fire was exposed to the elements. Within a month, after consulting many experts and with the agreement of the National Trust's Executive Committee, the restoration programme began. It was undertaken for three main reasons. After the fire it had become apparent just how much remained of the structure with its splendidly decorated interiors; to have pulled the house down, as one commentator suggested, would have been vandalism. Also the property was covered by insurance, so the repairs would not call upon the National Trust's own funds. Lastly, much had been saved of the fine collection acquired especially for Uppark from 1747 by Sir Matthew Featherstonhaugh and his son Harry. These objects belonged nowhere else, and complete restoration of the house would allow them to be seen and enjoyed again in their original setting.

F The search for craftsmen and women capable of doing the intricate restoration work was nation-wide. Once the quality and skill of the individual or company had been ascertained, they had to pass an economic test, as every job was competitively tendered. This has had enormous benefits because not only have a number of highly skilled people come to the fore – woodcarvers for example, following in the footsteps of Grinling Gibbons – but many of them, for example plasterers, have relearnt the skills of the seventeenth and eighteenth centuries which can now be of use to other country house owners when the need arises.

G In June 1994 the building programme was completed, on time and on budget. The total cost of the work to repair the house and its contents came to be nearly £20 million, largely met from insurance. In addition, it made economic sense for the National Trust to invest time and money in upgrading water and heating systems, installing modern environmental controls, and updating fire and security equipment.

H The final stages of restoration and the massive programme of reinstallation took eight months. The family and the room stewards were visibly moved when returning to their old haunts, perhaps the best testament that the spirit of Uppark had not died. But the debate will no doubt continue as to whether or not it was right to repair the house after the fire. The National Trust has done its best to remain true to Uppark; it is for others to judge the success of the project.

Note: The National Trust is a charitable organisation in Britain set up over a hundred years ago to preserve the national heritage.

Answer the questions below.

Choose **NO MORE THAN THREE WORDS** from the text for each answer.

Write your answers in boxes 34–37 on your answer sheet.

- 34 On what date in 1989 should the original repairs to the roof have been completed?
- 35 By what method were things rescued immediately from the burning house?
- 36 After the fire, what did the conservators require large quantities of immediately?
- 37 Into what did the conservators put material recovered from the fire?

Source : Cambridge Book 9

Practice 9

It's Only a Cockroach

I turn on the light in my kitchen that night, and then I see it. I draw back, and my first instinct is to scream. I control myself with difficulty, but find myself shuddering, unable to deal with the creature before me. It's only a cockroach, but its large size, long antennae, shiny appearance, and spiny legs, all present a particularly disgusting appearance. And this is not just to me, but to everyone it seems, even to the point of phobic responses.

This is certainly the overriding reason I want these creatures totally eradicated from my apartment, but with their offensive odour, passive transportation of microbes, and trails of droppings, they also pose a distinct threat to domestic hygiene. Clearly, cohabitation is not possible. So, I do all I can to keep these pests away. Food is stored in sealed containers, garbage cans have tight lids, my kitchen is kept spotlessly clean, and my apartment swept and mopped nightly. I have also sealed up possible entry points, but still, these loathsome things find their way inside. I need a way to kill them.

The most precise cockroach killer is, typically, another insect. A specific species of wasp targets these creatures. With a quick accurate swoop, it bites the cockroach at the main nerve centre of its body, which results in a temporary

paralysis. This is very necessary, as we all know just how fast cockroaches can run. The wasp has only a few minutes to prepare its next sting, in the exact area of the brain which controls the cockroaches' instinct to escape. After the paralysis departs, the cockroach is subdued and docile, and doomed. The wasp bites off the antennae to further discourage flight, then drags its victim away.

Faced with such predation, cockroaches usually conceal themselves during the day, and with their ability to flatten their bodies, they can disappear into just about any tiny nook, crevice, and cranny. There, they wait patiently for darkness before emerging to search for food, and will usually run away when exposed to light. Given this, I am told that the slim and agile house centipede is probably the most effective cockroach predator, able to track down and root out the most carefully hidden prey. Unfortunately, I would say that centipedes are even more disgusting to have in one's house, if that's possible. I just can't win this game.

Can anyone win? These insects are just about the hardest on the planet. Some can wait for up to three months before meals, some can survive on the barest hint of nutrition (such as the glue on the back of postage stamps), and some can live without air for over half an hour. They do not, however, handle cold weather well, preferring the warm conditions and security found within buildings.

Hidden there, the female lays egg capsules containing around 40 eggs, and with the insect's relatively long lifespan (about a year), some 300 to 400 offspring can ultimately be produced. The result: once these insects have infested a building, they are very difficult to eradicate.

Cockroaches do, however, have some subtleties. They leave chemical messages in their droppings, as well as emit airborne pheromones to signal other cockroaches about sources of food and water, and alert them to their own presence. The latter is more important, for these insects are actually somewhat gregarious. Research has shown that cockroaches make group-based decisions, and tend to cooperate. One study placed a large number of cockroaches in a dish with three small shelters, and the insects divided themselves equally between two of them, leaving the third one empty. When these shelters were

exchanged for two very large ones, all the cockroaches arranged themselves in just one. These creatures, it seems, prefer the company of others, and a rather fair allocation of resources.

Should I therefore feel any admiration? It is hard - in fact, in Western culture, cockroaches are almost universally depicted as repulsive and dirty pests. In the insect's most famous literary appearance - Franz Kafka's 'The Metamorphosis' - a man, Gregor, is transformed overnight into a monstrous insect, probably a cockroach (although the story never quite makes that clear). Gregor's transformation results in very predictable responses from his family and friends, who can never accept him again. He eventually dies, outcast and lonely, despised and mistreated - a potent symbol of alienation and rejection. Yet in the Pixar animated feature 'Wall-E', a cockroach provides essential companionship to a lone robot living on a planet scorched by a nuclear holocaust.

Whatever the case, I am faced with a big problem: a large ugly cockroach crawling slowly across my sink, antennae waving as it explores around. If I try to grab it, it will dart away, and I doubt whether I'll be able to catch it before it disappears into the numerous cracks and crevices of my old apartment. So, I carefully remove my slipper, determined to squash the insect, but then almost scream again as it lifts on its legs, raises membranous wings, and with a loud buzzing noise, flies away. Oh, just what I need, they can fly, too.

Answer the questions.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer

1. What aspect of cockroaches makes the author want them removed from the home?
2. What human aspect do they endanger?
3. Which insect is the best cockroach killer?
4. What can cockroaches do to easily hide?

Source: <http://ieltsonline-tests.com/>, *It's Only a Cockroach*

Practice 10

The start of the automobile's history

The start of the automobile's history went all the way back to 1769 when automobiles running on the steam engine were invented as carriers for human transport. In 1806, the first batch of cars powered by an internal combustion engine came into being, which pioneered the introduction of the widespread modern petrol-fueled internal combustion engine in 1885.

It is generally acknowledged that the first practical automobiles equipped with petrol/gasoline-powered internal combustion engines were invented almost at the same time by different German inventors who were working on their own. Karl Benz first built the automobile in 1885 in Mannheim. Benz attained a patent for his invention on 29 January 1886, and in 1888, he started to produce automobiles in a company that later became the renowned Mercedes-Benz.

As this century began, the automobile industry marched into the transportation market for wealth. Drivers at that time were an adventurous bunch; they would go out regardless of the weather condition even if they weren't even protected by an enclosed body or a convertible top. Everybody in the community knew who owned what car, and cars immediately became a symbol of identity and status. Later, cars became more popular among the public since it allowed people to travel whenever and wherever they wanted. Thus, the price of automobiles in Europe and North America kept dropping, and more people from the middle class could afford them. This was especially attributed to Henry Ford who did two crucial things. First, he set the price as reasonable as possible for his cars; second, he paid his employees enough salaries so that they could afford the cars made by their very own hands.

The trend of interchangeable parts and mass production in an assembly line style had been led by America, and from 1914, this concept was significantly reinforced by Henry Ford. This large-scale, production-line manufacture of affordable automobiles was debuted. A Ford car would come off all assembled

from the line every 15 minutes, an interval shorter than any of the former methods. Not only did it raise productivity, but also cut down on the requirement for manpower. Ford significantly lowered the chance of injury by carrying out complicated safety procedures in production—particularly assigning workers to specific locations rather than giving them the freedom to wander around. This mixture of high wages and high efficiency was known as Fordism, which provided a valuable lesson for most major industries.

The first Jeep automobile that came out as the prototype Bantam BRC was the primary light 4-wheel-drive automobile of the U.S. Army and Allies, and during World War II and the postwar period, its sale skyrocketed. Since then, plenty of Jeep derivatives with similar military and civilian functions have been created and kept upgraded in terms of overall performance in other nations.

Through all the 1950s, engine power and automobile rates grew higher, designs evolved into a more integrated and artful form, and cars were spreading globally. In the 1960s, the landscape changed as Detroit was confronted with foreign competition. The European manufacturers used the latest technology, and Japan came into the picture as a dedicated car-making country. General Motors, Chrysler, and Ford dabbled with radical tiny cars such as the GM A-bodies with little success. As joint ventures such as the British Motor Corporation unified the market, captive imports and badge imports swept all over the US and the UK. BMC first launched a revolutionary space-friendly Mini in 1959, which turned out to harvest large global sales. Previously remaining under the Austin and Morris names, Mini later became an individual marque in 1969. The trend of corporate consolidation landed in Italy when niche makers such as Maserati, Ferrari, and Lancia were bought by larger enterprises. By the end of the 20th century, there had been a sharp fall in the number of automobile marques.

In the US, car performance dominated marketing, justified by the typical cases of pony cars and muscle cars. However, in the 1970s, everything changed as the American automobile industry suffered from the 1973 oil crisis, competition with Japanese and European imports, automobile emission-control regulations* and moribund innovation. The irony in all this was that full-size sedans such as

Cadillac and Lincoln scored a huge comeback between the years of economic crisis.

In terms of technology, the most mentionable developments that the postwar era had seen were the widespread use of independent suspensions, broader application of fuel injection, and a growing emphasis on safety in automobile design. Mazda achieved many triumphs with its engine firstly installed in the fore-wheel, though it gained itself a reputation as a gas-guzzler.

The modern era also has witnessed a sharp elevation of fuel power in the modern engine management system with the help from the computer. Nowadays, most automobiles in use are powered by an internal combustion engine, fueled by gasoline or diesel. Toxic gas from both fuels is known to pollute the air and is responsible for climate change as well as global warming.

Answer the questions below.

Choose **NO MORE THAN THREE WORDS AND/OR A NUMBER** from the passage for each answer.

Write your answers in **boxes 20-26** on your answer sheet.

20. What is the important feature owned by the modern engine since the 19th century?
21. What did a car symbolise to the rich at the very beginning of this century?
22. How long did the Ford assembly line take to produce a car?
23. What is the major historical event that led American cars to suffer when competing with Japanese imported cars?
24. What do people call the Mazda car which was designed under the front-wheel engine?
25. What has greatly increased with the computerised engine management systems in modern society?
26. What factor is blamed for contributing to pollution, climate change and global warming?

Source: <http://ieltsionlinetests.com/>, *The start of the automobile's history*

Sentence Completion

In-class Content

Definition

As the name suggests you have to complete a sentence with a word, words, and/or a number. In such questions, sentences from the passage are paraphrased in short sentences and you have to fill in the missing blanks. Don't miss reading the instructions to see how many words you should fill in the blanks.

Strategy

1. **Read the instructions** very carefully taking particular note of the word limit for your answers.
2. **Read the questions** and try to understand what is being asked.
3. **Underline key words** in the questions. Also, think about possible synonyms for them. Predict the correct answer.

Don't worry if there are unfamiliar words. If they also appear in the text, you may be able to work them out in context. This question follows the passage order. The order of questions can help you. Answer for question 4 will be between answers for questions 3 and 5 in the text.

4. **Skim/Scan read the text.** Be alert for the keywords and synonyms you identified.
5. **Go back and re-read** question 1, then scan the first paragraph, maybe the second as well, until you find the location of the answer. Then read in detail to find the exact word or words you need to answer the question. Once you've found the answer, check if it fits into the statement grammatically and doesn't exceed the word limit.
6. **Repeat** this process for each of the questions.

Understanding Word Limit

1. **NO MORE THAN THREE WORDS AND/OR A NUMBER**
2. **ONE WORD ONLY**
3. **NO MORE THAN TWO WORDS**
4. This section requires some attention towards the spelling and number of words and numbers that you write
5. Numbers can be written using figures (12) or words (twelve), and will always count

Exercise 1

How atoms were discovered

Hundreds of years ago in 1785 Dutch scientist Jan Ingenhousz was studying a strange phenomenon that he couldn't quite make sense of. Minute particles of coal dust were darting about on the surface of some alcohol in his lab.

About 50 years later, in 1827, the Scottish botanist Robert Brown described something curiously similar. He had his microscope trained on some pollen grains. Brown noticed that some of the grains released tiny particles – which would then move away from the pollen grain in a random jittery dance.

At first, Brown wondered if the particles were really some sort of unknown organism. He repeated the experiment with other substances like rock dust, which he knew wasn't alive, and saw the same strange motion again.

It would take almost another century for science to offer an explanation. Einstein came along and developed a mathematical formula that would predict this very particular type of movement – by then called Brownian motion, after Robert Brown.

Einstein's theory was that the particles from the pollen grains were being moved around because they were constantly crashing into millions of tinier molecules of water – molecules that were made of atoms.

By 1908, observations backed with calculations had confirmed that atoms were real. Within about a decade, physicists would be able to go further. By pulling apart individual atoms they began to get a sense of their internal structure.

It might come as a surprise that atoms can be broken down – particularly since the very name atom derives from a Greek term “atoms”, which means “indivisible”. But physicists now know that atoms are not solid little balls. It’s better to think of them as tiny electrical, “planetary” systems. They’re typically made up of three main parts: protons, neutrons and electrons. Think of the protons and neutrons as together forming a “sun”, or nucleus, at the center of the system. The electrons orbit this nucleus, like planets.

Sentence completion questions: **NO MORE THAN TWO WORDS**

1. The type of random jittery movement of tiny particles is called

Einstein explained the phenomenon of particles' strange motion by the fact that they were collapsing with

3. Nowadays, scientists consider atoms' structures similar to tiny

4. are parts that are circling around the nucleus.

Source: <https://ielts-up.com>, *Sentence Completion*

Exercise 2

A giant panda at a zoo in the United States has given birth to twin cubs.

Keepers at the Smithsonian National Zoo in Washington DC only discovered Mei Xiang was pregnant during an ultrasound scan last week. The zoo said both cubs appeared healthy. Giant pandas are one of the most endangered species in the world and are notoriously hard to breed in captivity.

The National Zoo is one of only four zoos in the US to have pandas, which are on loan from China. Mei Xiang, who has two other offspring, is one of the zoo's star attractions and a Panda Cam in her enclosure crashed within seconds of the birth of the first cub being announced because of the volume of interest.

Female pandas are able to conceive for only two or three days a year, leading to a very low reproduction rate. Mei Xiang was artificially inseminated with sperm from the zoo's resident male Tian Tian and a panda named Hui Hui from Wolong, China. It will not be known for a while which is the father, or what sex the cubs are.

It has previously taken months before Mei Xiang's cubs have been introduced to the public. AP news agency reports that her first cub, Tai Shan, was born in 2005 and returned to China in 2010; her second cub, Bao Bao, is two years old on Sunday and still lives at the zoo. The panda population is threatened by habitat loss as land is increasingly inhabited by humans, with about 1,800 pandas left in the wild in China. However, the number living in the wild in China has gone up over the last 10 years.

Complete the sentences below.

Write **NO MORE THAN THREE WORDS** from the passage for each answer.

1. Mei Xiang pregnancy was discovered with an_____ last week.
2. Pandas from the USA National Zoo are_____ from China.
3. Due to the short conceiving period, pandas have a low _____.
4. Pandas are in danger because their lands are increasingly _____.

Source: <https://ielts-up.com>, *Sentence Completion*

Exercise 3

European Settlement of Australia

European settlement of Australia began in 1788 when a British penal colony was established on the east coast. From this starting point Australia grew rapidly and continually, expanding across the entire continent.

A number of reasons contributed to Britain's decision to colonize Australia. The most important factor was Britain's need to relieve its overcrowded prisons.

Several violent incidents at overcrowded prisons convinced the British government of the need to separate unruly elements from the rest of the prison populace.

Additionally, Australia was of strategic importance to Britain, and it provided a base for the Royal Navy in the eastern sea. Also, Australia could be used as an entry point to the economic opportunities of the surrounding region. All these points figured in the decision by Lord Sydney, secretary of state of home affairs, to authorize the colonization.

To this effect, on May 13, 1787, Captain Arthur Phillip, commanding eleven ships full of convicts, left Britain for Australia. He successfully landed a full fleet at Botany Bay on January 18, 1788. However, they left the bay eight days later because of its openness and poor soil, and settled instead at Port Jackson, a few kilometers north. The ships landed 1,373 people, including 732 convicts, and the settlement became Sydney. Australia Day is now celebrated on 26 January each year, to commemorate this first fleet landing.

Questions 1-5

Complete the following statements using **NO MORE THAN THREE WORDS**.

1. Australia was originally founded as a _____.
2. The major consideration in colonizing Australia was Britain's _____.
3. It was thought that _____ could be gained in that part of the world due to the access provided via Australia.
4. Lord Sydney took every factor into account when he gave official permission for the _____ of Australia.
5. Botany Bay was abandoned by the settlers due to the lack of cover and _____.

Source: <https://www.britannica.com>, *European Settlement of Australia*

Practice Exercises

Practice 1

The meaning and power of smell

The sense of smell, or olfaction, is powerful. Odours affect us on a physical, psychological and social level. For the most part, however, we breathe in the aromas which surround us without being consciously aware of their importance to us. It is only when the faculty of smell is impaired for some reason that we begin to realise the essential role the sense of smell plays in our sense of well-being

A

A survey conducted by Anthony Synott at Montreal's Concordia University asked participants to comment on how important smell was to them in their lives. It became apparent that smell can evoke strong emotional responses. A scent associated with a good experience can bring a rush of joy, while a foul odour or one associated with a bad memory may make us grimace with disgust. Respondents to the survey noted that many of their olfactory likes and dislikes were based on emotional associations. Such associations can be powerful enough so that odours that we would generally label unpleasant become agreeable, and those that we would generally consider fragrant become disagreeable for particular individuals. The perception of smell, therefore, consists not only of the sensation of the odours themselves, but of the experiences and emotions associated with them.

B

Odours are also essential cues in social bonding. One respondent to the survey believed that there is no true emotional bonding without touching and smelling a loved one. In fact, infants recognise the odours of their mothers soon after birth and adults can often identify their children or spouses by scent. In one well-known test, women and men were able to distinguish by smell alone clothing worn by their marriage partners from similar clothing

worn by other people. Most of the subjects would probably never have given much thought to odour as a cue for identifying family members before being involved in the test, but as the experiment revealed, even when not consciously considered, smells register.

C

In spite of its importance to our emotional and sensory lives, smell is probably the most undervalued sense in many cultures. The reason often given for the low regard in which smell is held is that, in comparison with its importance among animals, the human sense of smell is feeble and undeveloped. While it is true that the olfactory powers of humans are nothing like as fine as those possessed by certain animals, they are still remarkably acute. Our noses are able to recognise thousands of smells, and to perceive odours which are present only in extremely small quantities.

D

Smell, however, is a highly elusive phenomenon. Odours, unlike colours, for instance, cannot be named in many languages because the specific vocabulary simply doesn't exist. 'It smells like . . .,' we have to say when describing an odour, struggling to express our olfactory experience. Nor can odours be recorded: there is no effective way to either capture or store them over time. In the realm of olfaction, we must make do with descriptions and recollections. This has implications for olfactory research.

E

Most of the research on smell undertaken to date has been of a physical scientific nature. Significant advances have been made in the understanding of the biological and chemical nature of olfaction, but many fundamental questions have yet to be answered. Researchers have still to decide whether smell is one sense or two - one responding to odours properly and the other registering odourless chemicals in the air. Other unanswered questions are whether the nose is the only part of the body affected by odours, and how smells can be measured objectively given the nonphysical components. Questions like these mean that interest in the psychology of smell is inevitably set to play an increasingly important role for researchers.

F

However, smell is not simply a biological and psychological phenomenon. Smell is cultural, hence it is a social and historical phenomenon. Odours are invested with cultural values: smells that are considered to be offensive in some cultures may be perfectly acceptable in others. Therefore, our sense of smell is a means of, and model for, interacting with the world. Different smells can provide us with intimate and emotionally charged experiences and the value that we attach to these experiences is interiorised by the members of society in a deeply personal way. Importantly, our commonly held feelings about smells can help distinguish us from other cultures. The study of the cultural history of smell is, therefore, in a very real sense, an investigation into the essence of human culture.

Questions 37-40

Complete the sentences below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes **11-14** on your answer sheet.

37. Tests have shown that odours can help people recognise the _____ belonging to their husbands and wives.

38. Certain linguistic groups may have difficulty describing smell because they lack the appropriate _____

39. The sense of smell may involve response to _____ which do not smell, in addition to obvious odours.

40. Odours regarded as unpleasant in certain _____ are not regarded as unpleasant in others.

Explanation for Q37:-

Apply the tips as taught above:

37. Please look for the Key words: tests, odours, recognize, husbands and wives.

In paragraph B, “In one well-known test, women and men were able to distinguish by smell alone clothing worn by their marriage partners from similar clothing worn by other people”.

This means that the special smell in clothing worn by husbands or wives can be used to recognize their marriage partners.

– odours = smell

– recognize = distinguish

– their husbands and wives = their marriage partners

=> ANSWER: CLOTHING

Source: Cambridge Book 8

Practice 2

Striking Back at Lightning With Lasers

Seldom is the weather more dramatic than when thunderstorms strike. Their electrical fury inflicts death or serious injury on around 500 people each year in the United States alone. As the clouds roll in, a leisurely round of golf can become a terrifying dice with death – out in the open, a lone golfer may be a lightning bolt’s most inviting target. And there is damage to property too. Lightning damage costs American power companies more than \$100 million a year.

But researchers in the United States and Japan are planning to hit back. Already in laboratory trials they have tested strategies for neutralising the power of thunderstorms, and this winter they will brave real storms, equipped with an armoury of lasers that they will be pointing towards the heavens to discharge thunderclouds before lightning can strike.

The idea of forcing storm clouds to discharge their lightning on command is not new. In the early 1960s, researchers tried firing rockets trailing wires into thunderclouds to set up an easy discharge path for the huge electric charges that these clouds generate. The technique survives to this day at a test site in Florida run by the University of Florida, with support from the Electrical Power Research Institute (EPRI), based in California. EPRI, which is funded by power companies, is looking at ways to protect the United States’ power grid from lightning strikes. ‘We can cause the lightning to strike where we want it to using rockets,’ says Ralph Bernstein, manager of lightning projects at EPRI. The rocket site is providing precise measurements of lightning voltages and allowing engineers to check how electrical equipment bears up.

Bad behaviour

But while rockets are fine for research, they cannot provide the protection from lightning strikes that everyone is looking for. The rockets cost around \$1,200 each, can only be fired at a limited frequency and their failure rate is about 40 per cent. And even when they do trigger lightning, things still do not always go according to plan. 'Lightning is not perfectly well behaved,' says Bernstein. 'Occasionally, it will take a branch and go someplace it wasn't supposed to go.'

And anyway, who would want to fire streams of rockets in a populated area? 'What goes up must come down,' points out Jean-Claude Diels of the University of New Mexico. Diels is leading a project, which is backed by EPRI, to try to use lasers to discharge lightning safely

– and safety is a basic requirement since no one wants to put themselves or their expensive equipment at risk. With around \$500,000 invested so far, a promising system is just emerging from the laboratory.

The idea began some 20 years ago, when high-powered lasers were revealing their ability to extract electrons out of atoms and create ions. If a laser could generate a line of ionisation in the air all the way up to a storm cloud, this conducting path could be used to guide lightning to Earth, before the electric field becomes strong enough to break down the air in an uncontrollable surge. To stop the laser itself being struck, it would not be pointed straight at the clouds. Instead it would be directed at a mirror, and from there into the sky. The mirror would be protected by placing lightning conductors close by. Ideally, the cloud-zapper (gun) would be cheap enough to be installed around all key power installations, and portable enough to be taken to international sporting events to beam up at brewing storm clouds.

A stumbling block

However, there is still a big stumbling block. The laser is no nifty portable: it's a monster that takes up a whole room. Diels is trying to cut down the size and says that a laser around the size of a small table is in the offing. He plans to test this more manageable system on live thunderclouds next summer.

Bernstein says that Diels's system is attracting lots of interest from the power companies. But they have not yet come up with the \$5 million that EPRI says will be needed to develop a commercial system, by making the lasers yet smaller and cheaper. 'I cannot say I have money yet, but I'm working on it,' says Bernstein. He reckons that the forthcoming field tests will be the turning point – and he's hoping for good news. Bernstein predicts 'an avalanche of interest and support' if all goes well. He expects to see cloud-zappers eventually costing \$50,000 to \$100,000 each.

Other scientists could also benefit. With a lightning 'switch' at their fingertips, materials scientists could find out what happens when mighty currents meet matter. Diels also hopes to see the birth of 'interactive meteorology' – not just forecasting the weather but controlling it. 'If we could discharge clouds, we might affect the weather,' he says.

And perhaps, says Diels, we'll be able to confront some other meteorological menaces. 'We think we could prevent hail by inducing lightning,' he says. Thunder, the shock wave that comes from a lightning flash, is thought to be the trigger for the torrential rain that is typical of storms. A laser thunder factory could shake the moisture out of clouds, perhaps preventing the formation of the giant hailstones that threaten crops. With luck, as the storm clouds gather this winter, laser-toting researchers could, for the first time, strike back.

Questions 4–6

Complete the sentences below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 4–6 on your answer sheet.

- 4 EPRI receives financial support from
- 5 The advantage of the technique being developed by Diels is that it can be used
- 6 The main difficulty associated with using the laser equipment is related to its

Source: Cambridge Book 8

Practice 3

The Context, Meaning and Scope of Tourism

A Travel has existed since the beginning of time, when primitive man set out, often traversing great distances in search of game, which provided the food and clothing necessary for his survival. Throughout the course of history, people have travelled for purposes of trade, religious conviction, economic gain, war, migration and other equally compelling motivations. In the Roman era, wealthy aristocrats and high government officials also travelled for pleasure. Seaside resorts located at Pompeii and Herculaneum afforded citizens the opportunity to escape to their vacation villas in order to avoid the summer heat of Rome. Travel, except during the Dark Ages, has continued to grow and, throughout recorded history, has played a vital role in the development of civilisations and their economies.

B Tourism in the mass form as we know it today is a distinctly twentieth-century phenomenon. Historians suggest that the advent of mass tourism began in England during the industrial revolution with the rise of the middle class and the availability of relatively inexpensive transportation. The creation of the commercial airline industry following the Second World War and the subsequent development of the jet aircraft in the 1950s signalled the rapid growth and expansion of international travel. This growth led to the development of a major new industry: tourism. In turn, international tourism became the concern of a number of world governments since it not only provided new employment opportunities but also produced a means of earning foreign exchange.

C Tourism today has grown significantly in both economic and social importance. In most industrialised countries over the past few years the fastest growth has been seen in the area of services. One of the largest segments of the service industry, although largely unrecognised as an entity in some of these countries, is travel and tourism. According to the World Travel and Tourism Council (1992), Travel and tourism is the largest industry in the world on virtually any economic measure including value-added capital investment, employment and tax contributions. In 1992' the industry's gross output was estimated to be \$3.5 trillion, over 12 percent of all consumer spending. The travel and tourism industry is the world's largest employer with almost 130 million jobs, or almost 7 per cent of all employees. This industry is the world's leading industrial contributor, producing over 6 percent of the world's national product and accounting for capital investment in excess of \$422 billion m direct indirect and personal taxes each year. Thus, tourism has a profound impact both on the world economy and, because of the educative effect of travel and the effects on employment, on society itself.

D However, the major problems of the travel and tourism industry that have hidden, or obscured, its economic impact are the diversity and fragmentation of the industry itself. The travel industry includes: hotels, motels and other types of accommodation; restaurants and other food services; transportation services and facilities; amusements, attractions and other leisure facilities; gift shops and a large number of other enterprises. Since many of these businesses also serve

local residents, the impact of spending by visitors can easily be overlooked or underestimated. In addition, Meis (1992) points out that the tourism industry involves concepts that have remained amorphous to both analysts and decision makers. Moreover, in all nations this problem has made it difficult for the industry to develop any type of reliable or credible tourism information base in order to estimate the contribution it makes to regional, national and global economies. However, the nature of this diversity makes travel and tourism ideal vehicles for economic development in a wide variety of countries, regions or communities.

E Once the exclusive province of the wealthy, travel and tourism have become an institutionalised way of life for most of the population. In fact, McIntosh and Goeldner (1990) suggest that tourism has become the largest commodity in international trade for many nations and, for a significant number of other countries, it ranks second or third. For example, tourism is the major source of income in Bermuda, Greece, Italy, Spain, Switzerland and most Caribbean countries. In addition, Hawkins and Ritchie, quoting from data published by the American Express Company, suggest that the travel and tourism industry is the number one ranked employer in the Bahamas, Brazil, Canada, France, (the former) West Germany, Hong Kong, Italy, Jamaica, Japan, Singapore, the United Kingdom and the United States. However, because of problems of definition, which directly affect statistical measurement, it is not possible with any degree of certainty to provide precise, valid or reliable data about the extent of world-wide tourism participation or its economic impact. In many cases, similar difficulties arise when attempts are made to measure domestic tourism.

Questions 11-13

Complete the sentences below.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

Write your answers in boxes 11-13 on your answer sheet.

11. In Greece, tourism the most important _____

12. The travel and tourism industry in Jamaica is the major _____

13. The problems associated with measuring international tourism are often reflected in the measurement of _____

Source: Cambridge Book 10

Practice 4

Let's Go Bats

A Bats have a problem: how to find their way around in the dark. They hunt at night, and cannot use light to help them find prey and avoid obstacles. You might say that this is a problem of their own making, one that they could avoid simply by changing their habits and hunting by day. But the daytime economy is already heavily exploited by other creatures such as birds. Given that there is a living to be made at night, and given that alternative daytime trades are thoroughly occupied, natural selection has favoured bats that make a go of the night-hunting trade. It is probable that the nocturnal trades go way back in the ancestry of all mammals. In the time when the dinosaurs dominated the daytime economy, our mammalian ancestors probably only managed to survive at all because they found ways of scraping a living at night. Only after the mysterious mass extinction of the dinosaurs about 65 million years ago were our ancestors able to emerge into the daylight in any substantial numbers.

B Bats have an engineering problem: how to find their way and find their prey in the absence of light. Bats are not the only creatures to face this difficulty today. Obviously the night-flying insects that they prey on must find their way about somehow. Deep-sea fish and whales have little or no light by day or by night. Fish and dolphins that live in extremely muddy water cannot see because, although there is light, it is obstructed and scattered by the dirt in the water. Plenty of other modern animals make their living in conditions where seeing is difficult or impossible.

C Given the questions of how to manoeuvre in the dark, what solutions might an engineer consider? The first one that might occur to him is to manufacture light, to use a lantern or a searchlight. Fireflies and some fish (usually with the help of bacteria) have the power to manufacture their own light, but the process seems to consume a large amount of energy. Fireflies use their light for attracting mates. This doesn't require a prohibitive amount of energy: a male's tiny pinprick of light can be seen by a female from some distance on a dark night, since her eyes are exposed directly to the light source itself. However, using light to find one's own way around requires vastly more energy, since the eyes have to detect the tiny fraction of the light that bounces off each part of the scene. The light source must therefore be immensely brighter if it is to be used as a headlight to illuminate the path, than if it is to be used as a signal to others. In any event, whether or not the reason is the energy expense, it seems to be the case that, with the possible exception of some weird deep-sea fish, no animal apart from man uses manufactured light to find its way about.

D

What else might the engineer think of? Well, blind humans sometimes seem to have an uncanny sense of obstacles in their path. It has been given the name 'facial vision', because blind people have reported that it feels a bit like the sense of touch, on the face. One report tells of a totally blind boy who could ride his tricycle at good speed round the block near his home, using facial vision. Experiments showed that, in fact, facial vision is nothing to do with touch or the front of the face, although the sensation may be referred to the front of the face, like the referred pain in a phantom limb. The sensation of facial vision, it turns out, really goes in through the ears.

Blind people, without even being aware of the fact, are actually using echoes of their own footsteps and of other sounds, to sense the presence of obstacles. Before this was discovered, engineers had already built instruments to exploit the principle, for example to measure the depth of the sea under a ship. After this technique had been invented, it was only a matter of time before weapons designers adapted it for the detection of submarines. Both sides in the Second World War relied heavily on these devices, under such codenames as Asdic (British) and Sonar (American), as well as Radar (American) or RDF (British), which uses radio echoes rather than sound echoes.

E The Sonar and Radar pioneers didn't know it then, but all the world now knows that bats, or rather natural selection working on bats, had perfected the system tens of millions of years earlier; and their radar' achieves feats of detection and navigation that would strike an engineer dumb with admiration. It is technically incorrect to talk about bat 'radar', since they do not use radio waves. It is sonar. But the underlying mathematical theories of radar and sonar are very similar; and much of our scientific understanding of the details of what bats are doing has come from applying radar theory to them. The American zoologist Donald Griffin, who was largely responsible for the discovery of sonar in bats, coined the term 'écholocation' to cover both sonar and radar, whether used by animals or by human instruments.

Questions 10-13

Complete the sentences below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 10-13 on your answer sheet.

10. Long before the invention of radar _____, had resulted in a sophisticated radar-like system in bats.
11. Radar is an inaccurate term when referring to bats because _____ are not used in their navigation system.
12. Radar and sonar are based on similar _____
13. The word 'echolocation' was first used by someone working as a _____

Source: Cambridge Book 7

Practice 5

Cutty Sark: the fastest sailing ship of all time

The nineteenth century was a period of great technological development in Britain, and for shipping the major changes were from wind to steam power, and from wood to iron and steel.

The fastest commercial sailing vessels of all time were clippers, three-masted ships built to transport goods around the world, although some also took passengers. From the 1840s until 1869, when the Suez Canal opened and steam propulsion was replacing sail, clippers dominated world trade. Although many were built, only one has survived more or less intact: Cutty Sark, now on display in Greenwich, southeast London.

Cutty Sark's unusual name comes from the poem *Tam O'Shanter* by the Scottish poet Robert Burns. Tam, a farmer, is chased by a witch called Nannie, who is wearing a 'cutty sark' – an old Scottish name for a short nightdress. The witch is depicted in Cutty Sark's figurehead – the carving of a woman typically at the front of old sailing ships. In legend, and in Burns's poem, witches cannot cross water, so this was a rather strange choice of name for a ship.

Cutty Sark was built in Dumbarton, Scotland, in 1869, for a shipping company owned by John Willis. To carry out construction, Willis chose a new shipbuilding firm, Scott & Linton, and ensured that the contrast with them put him in a very strong position. In the end, the firm was forced out of business, and the ship was finished by a competitor.

Willis's company was active in the tea trade between China and Britain, where speed could bring shipowners both profits and prestige, so Cutty Sark was designed to make the journey more quickly than any other ship. On her maiden voyage, in 1870, she set sail from London, carrying large amounts of goods to China. She returned laden with tea, making the journey back to London in four months. However, Cutty Sark never lived up to the high expectations of her owner, as a result of bad winds and various misfortunes. On one occasion, in 1872, the ship and a rival clipper, *Thermopylae*, left port in China on the same day. Crossing the Indian Ocean, Cutty Sark gained a lead of over 400 miles, but then her rudder was severely damaged in stormy seas, making her impossible to steer. The ship's crew had the daunting task of repairing the rudder at sea, and only succeeded at the second attempt. Cutty Sark reached London a week after *Thermopylae*.

Steam ships posed a growing threat to clippers, as their speed and cargo capacity increased. In addition, the opening of the Suez Canal in 1869, the same year that Cutty Sark was launched, had a serious impact. While steam ships could make use of the quick, direct route between the Mediterranean and the Red Sea, the canal was of no use to sailing ships, which needed the much stronger winds of the oceans, and so had to sail a far greater distance. Steam ships reduced the journey time between Britain and China by approximately two months.

By 1878, tea traders weren't interested in Cutty Sark, and instead, she took on the much less prestigious work of carrying any cargo between any two ports in the world. In 1880, violence aboard the ship led ultimately to the replacement of the captain with an incompetent drunkard who stole the crew's wages. He was suspended from service, and a new captain appointed. This marked a turnaround and the beginning of the most successful period in Cutty Sark's working life, transporting wool from Australia to Britain. One such journey took just under 12 weeks, beating every other ship sailing that year by around a month.

The ship's next captain, Richard Woodget, was an excellent navigator, who got the best out of both his ship and his crew. As a sailing ship, Cutty Sark depended on the strong trade winds of the southern hemisphere, and Woodget took her further south than any previous captain, bringing her dangerously close to icebergs off the southern tip of South America. His gamble paid off, though, and the ship was the fastest vessel in the wool trade for ten years.

As competition from steam ships increased in the 1890s, and Cutty Sark approached the end of her life expectancy, she became less profitable. She was sold to a Portuguese firm, which renamed her Ferreira. For the next 25 years, she again carried miscellaneous cargoes around the world.

Badly damaged in a gale in 1922, she was put into Falmouth harbor in southwest England, for repairs. Wilfred Dowman, a retired sea captain who owned a training vessel, recognised her and tried to buy her, but without success. She returned to Portugal and was sold to another Portuguese company. Dowman was determined, however, and offered a high price: this was accepted, and the ship returned to Falmouth the following year and had her original name restored.

Dowman used Cutty Sark as a training ship, and she continued in this role after his death. When she was no longer required, in 1954, she was transferred to dry dock at Greenwich to go on public display. The ship suffered from fire in 2007, and again, less seriously, in 2014, but now Cutty Sark attracts a quarter of a million visitors a year.

Complete the sentences below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes 9-13 on your answer sheet.

9. After 1880, Cutty Sark carried as its main cargo during its most successful time.
10. As a captain and, Woodget was very skilled.
11. Ferreira went to Falmouth to repair damage that a had caused.
12. Between 1923 and 1954, Cutty Sark was used for
13. Cutty Sark has twice been damaged by in the 21st century.

Source: Cambridge Book 13

Practice 6

Light is important to organisms for two different reasons. Firstly it is used as a cue for the timing of daily and seasonal rhythms in both plants and animals, and secondly it is used to assist growth in plants.

Breeding in most organisms occurs during a part of the year only, and so a reliable cue is needed to trigger breeding behaviour. Day length is an excellent cue, because it provides a perfectly predictable pattern of change within the year. In the temperate zone in spring, temperatures fluctuate greatly from day to day, but day length increases steadily by a predictable amount. The seasonal impact of day length on physiological responses is called photoperiodism, and the amount of experimental evidence for this phenomenon is considerable. For example, some species of birds' breeding can be induced even in midwinter

simply by increasing day length artificially (Wolfson 1964). Other examples of photoperiodism occur in plants. A short-day plant flowers when the day is less than a certain critical length. A long-day plant flowers after a certain critical day length is exceeded. In both cases the critical day length differs from species to species. Plants which flower after a period of vegetative growth, regardless of photoperiod, are known as day-neutral plants.

Breeding seasons in animals such as birds have evolved to occupy the part of the year in which offspring have the greatest chances of survival. Before the breeding season begins, food reserves must be built up to support the energy cost of reproduction, and to provide for young birds both when they are in the nest and after fledging. Thus many temperate-zone birds use the increasing day lengths in spring as a cue to begin the nesting cycle, because this is a point when adequate food resources will be assured.

The adaptive significance of photoperiodism in plants is also clear. Short-day plants that flower in spring in the temperate zone are adapted to maximising seedling growth during the growing season. Long-day plants are adapted for situations that require fertilization by insects, or a long period of seed ripening. Short-day plants that flower in the autumn in the temperate zone are able to build up food reserves over the growing season and over winter as seeds. Day-neutral plants have an evolutionary advantage when the connection between the favourable period for reproduction and day length is much less certain. For example, desert annuals germinate, flower and seed whenever suitable rainfall occurs, regardless of the day length.

The breeding season of some plants can be delayed to extraordinary lengths. Bamboos are perennial grasses that remain in a vegetative state for many years and then suddenly flower, fruit and die (Evans 1976). Every bamboo of the species *Chusquea abietifolia* on the island of Jamaica flowered, set seed and died during 1884. The next generation of bamboo flowered and died between 1916 and 1918, which suggests a vegetative cycle of about 31 years. The climatic trigger for this flowering cycle is not yet known, but the adaptive significance is clear. The simultaneous production of masses of bamboo seeds (in some cases lying 12 to 15 centimetres deep on the ground) is more than all the seed-eating animals can cope with at the time, so that some seeds escape being eaten and grow up to form the next generation (Evans 1976).

The second reason light is important to organisms is that it is essential for photosynthesis. This is the process by which plants use energy from the sun to convert carbon from soil or water into organic material for growth. The rate of photosynthesis in a plant can be measured by calculating the rate of its uptake of carbon. There is a wide range of photosynthetic responses of plants to variations in light intensity. Some plants reach maximal photosynthesis at one-quarter full sunlight, and others, like sugarcane, never reach a maximum, but continue to increase photosynthesis rate as light intensity rises.

Plants in general can be divided into two groups: shade-tolerant species and shade-intolerant species. This classification is commonly used in forestry and horticulture. Shade-tolerant plants have lower photosynthetic rates and hence have lower growth rates than those of shade-intolerant species. Plant species become adapted to living in a certain kind of habitat, and in the process evolve a series of characteristics that prevent them from occupying other habitats. Grime (1966) suggests that light may be one of the major components directing these adaptations. For example, eastern hemlock seedlings are shade-tolerant. They can survive in the forest understorey under very low light levels because they have a low photosynthetic rate.

Questions 34-40

Complete the sentences. Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

34. Day length is a useful cue for breeding in areas where are unpredictable.
35. Plants which do not respond to light levels are referred to as
36. Birds in temperate climates associate longer days with nesting and the availability of
37. Plants that flower when days are long often depend on to help them reproduce.
38. Desert annuals respond to as a signal for reproduction.
39. There is no limit to the photosynthetic rate in plants such as

40. Tolerance to shade is one criterion for the horticulture of plants in forestry and horticulture.

Source: Cambridge Book 5

Practice 7

THE DAMS THAT CHANGED AUSTRALIA

Section One

Inland Australia has had a problem with drought from the time of white settlement in 1788 until today, and this is why the Snowy Mountains Scheme was conceived and founded. Before the Snowy Scheme a large proportion of the snowfields on Australia's highest mountains (the Snowy Mountains) melted into the Snowy River every year. Hence, Snowy River water flowed, ultimately, into the sea, not toward the dry interior of the country, where people needed it so desperately. This was first recognised by the Polish geologist and explorer Strezlecki in 1840, who commented that there could be no development of the inland without adequate water supply. The rivers would have to be diverted if irrigation were to succeed.

Before the Federation in 1901, Australia consisted of a group of colonies, all anxious to protect their own interests. After Federation the states retained rights to the water, and thus to what might happen to the rivers. Arguments between New South Wales, Victoria and South Australia led to a deadlocked Premiers' Conference in 1947. Despite this serious dispute, the Federal Parliament passed the Snowy Mountains Hydro-electric Power Act just two years later, on July 7. The project officially commenced on October 17 that year, barely three months after the act had been passed.

The scheme set out to harness water for electricity and to divert it back to the dry inland areas for irrigation. To do this, thousands of kilometres of tunnels had to be drilled through the mountains, and sixteen major dams and seven hydro-electric power stations built over a period of nineteen years. The first of these was Guthega Power Station, which was commissioned in 1954. and the last one to be finished was Tumut III.

Section Two

The Snowy Mountains Scheme was to alter the face of Australia forever. One important change was the recruitment of people from outside Australia to work on the scheme. In 1949, while the world was still recovering from the effects of World War II (1939 to 1945), the Australian government needed immense numbers of people to work on the Snowy. It sought labour from overseas, and 60,000 of the 100,000 people who worked on the scheme came from outside the country.

They came from thirty different countries: from Italy, Yugoslavia, and Germany, from sophisticated cities like Budapest, Paris and Vienna, and from tiny hamlets. These European workers left countries which had fought against each other during the war, and which had vastly different cultures, and they found themselves in a country which was still defining itself. They were adventurous young men, some highly skilled, some not, and they came to a place which offered both enormous challenges and primitive conditions. Many were housed in tents in the early days of the scheme, although some fortunate men were placed in barracks. The food was basic, female company extremely scarce and entertainment lacking.

Section Three

Many new arrivals spoke only limited English, and were offered English classes after work. The men needed primarily to understand safety instructions, and safety lectures were conducted in English and other languages. In fact, a great deal of communication underground was by sign language, especially when the conditions were noisy. The signs were peculiar to the business at hand: for instance, a thumb placed near the mouth meant water, but did not indicate whether the water was needed on the drill the man was using, or for a drink.

The constant reference to the men who worked on the Snowy is appropriate because few women worked on the scheme, and those who were employed usually held office jobs. Women, however, were active in the community, and the members of the Country Women's Association gave English lessons. Other English instruction was provided by the Australian Broadcasting Commission, which ran daily broadcasts to help the newcomers with the language.

Section Four

These circumstances could have caused great social trouble, but there were relatively few serious problems. The men worked long and hard, and many saved their money with a view to settling in Australia or returning home. At a reunion in 1999 many were happy to remember the hardships of those days, but it was all seen through a glow of achievement. This satisfaction was felt not only by the men who worked directly on the project, but by the women, many of whom had been wives and mothers during the scheme, and indicated that they had felt very much part of it.

The children of these couples went to school in Happy Jack, a town notable for having the highest school in Australia, and the highest birth rate. In one memorable year there were thirty babies born to the eighty families in Happy Jack. Older children went to school in Cooma, the nearest major town.

Section Five

The scheme is very unlikely to be repeated. The expense of putting the power stations underground would now be prohibitive, and our current information about ecology would require a different approach to the treatment of the rivers. Other hydro-electric schemes like the Tennessee Valley Authority preceded the Snowy Mountains Scheme, and others have followed. The Snowy Mountains Scheme is the only hydro-electric scheme in the world to be totally financed from the sale of its electricity.

As well as being a great engineering feat, the scheme is a monument to people from around the world who dared to change their lives. Some are living and working in Australia, many have retired there, some have returned to their countries of origin. Every one of them contributed to altering Australian society forever.

Complete the sentences.

Choose **NO MORE: THAN THREE WORDS** from the passage for each answer.

Write your answers in boxes 12 - 13 on your answer sheet.

12. The workers reminisced about the _____ endured in the early days at their reunion.

13. The Snowy Mountains Scheme was considered an _____ which altered Australian society thereafter.

Source: <http://ieltsonline-tests.com/>, *THE DAMS THAT CHANGED AUSTRALIA*

Practice 8

Pine Trees

I am looking at a very thick twisted trunk, rising to medium height, at which point appears a stumpy canopy of spiky needles. It's a tree, but a very special one. Ron Simonson, a park ranger explains. "It's a bristlecone pine, and it's been given the name, Methuselah". I ask the obvious question, and Ron replies, "Because like Methuselah from the bible, this tree is very old, one of the oldest living things on Earth in fact." I ask the next obvious question, and Ron replies, "Basically Methuselah has existed throughout virtually all of recorded human history." I look again at this quiet and unassuming tree, beginning to realise it is worthy of great respect.

Being in a cold climate, facing limited summer seasons, rooted in nutrient poor and dry soil, and subject to high winds and wuthering winters, bristlecone pines mature very slowly indeed. Yet mature they do, as with all pines becoming fractionally thicker every year as another growth ring is added to their trunk. By counting these, we can accurately state that, as of 2011, Methuselah was 4,842 years old, meaning that it sprouted as a seedling in 2832 BC, centuries before the ancient Egyptians began building their pyramids. And that's just one fascinating fact about that well-known species of tree - the pine.

Pines trees are native to most of the Northern Hemisphere. Several species have adapted to the harsh conditions of high elevations and latitudes, including Methuselah himself, growing among the peaks of the White Mountains of Northern California.

Pines can be small, such as the Siberian Dwarf Pine, or huge, such as the Ponderosa Pine in the wilds of Oregon, and there are over 100 varieties in all.

They have been introduced into the more temperate portions of the Southern Hemisphere, where they are now grown widely, becoming a familiar feature in parks and gardens. It would not be too much of an exaggeration to say that almost everyone knows pines.

These trees certainly have many telltale characteristics. They are evergreen, usually with needle-like foliage and a sharp pleasant pine smell. They are often large and imposing, with thick scaly bark, and always produce their signature pine cones. These formations are certainly not simple. They can be male (small, inconspicuous, and shedding pollen) or female (large, woody, and containing seeds), even when appearing on the same tree. They have numerous scales arranged in a spiral, with seeds (on the female) tucked within. As the cone opens, the seeds eventually fall out, mostly to be dispersed by the wind, or sometimes by birds. In some varieties, the cones remain closed until their binding resin is melted by forest fires.

This last fact - the need for wildfires for regeneration - is another fascinating aspect of many pine species. In fire-prone areas, it can result in extensive stands of pines, a good example being in 'pine barrens'. These are eco-regions of sandy nutrient-poor soil dominated by pines, since the frequency of natural (usually lightning-induced) fires weeds out the less fire-tolerant species. It is perhaps sad that modern fire prevention methods have resulted in the decline of many pine species in the wild, and most ancient pine barrens are now being taken over by other forest vegetation.

However, the situation is very different for home and commercial use, which has seen pines become a very common sight. As these trees grow fast, can be planted in dense arrays, and produce attractive and easily moulded wood, they are favourites for commercial plantations. The wood is fragrant, but prone to decay, so it is most suitable for indoor or dry carpentry, rather than outdoors, where more durable varieties are necessary. As for other uses of pines, their branches are valued as Christmas trees, and their wood is also pulped in factories for paper and chipboard production. Pine resin is a byproduct, and this is collected for distillation into turpentine, an important industrial solvent.

In a more homely sense, perhaps what people most like are the cones, the

largest of which are regularly used by children and craft enthusiasts. With the widespread distribution of pines across the Northern Hemisphere, cones form part of the many traditional cultures there, where they are used for decorative purposes, fire starters, bird feeders, or just intriguing natural playthings for young children. Many people lament that modern manufactured toys in the more affluent of these countries have displaced cones, although some Nordic communities still teach traditional 'cone-craft' in high schools.

For some reason, I always come back to Methuselah. Ron tells me a story. In 1964, a student was taking a coring sample from another bristlecone pine in the area. His coring tool broke, so the tree was cut down to allow dating by an examination of a cross-section of its trunk. Upon doing this, to the astonishment of all, 4,844 rings were counted, signifying that the tree was even older than Methuselah. Ron smiles wryly at the thought. 'We deliberately killed the oldest life on Earth. That's one reason why we keep the location of Methuselah a secret. This tree is precious, and must be kept free from all human interference.'

Complete the sentences.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

1. Every year, pine trees gain another _____
2. The pyramids were built hundreds of years after _____
3. Typical of all pines are their _____
4. The wood from pines is not very _____

Source: <http://ieltsionlinetests.com/>, *Pine Trees*

Practice 9

AUSTRALIA'S PLATYPUS

Of all the creatures on the earth, the Australian platypus, *Ornithorhynchus*

Paradoxus, is perhaps one of the most mysterious and reclusive. Derived from the Latin platys meaning 'flat and broad' and pous meaning 'foot', the platypus has long been an iconic symbol of Australia. Upon being discovered in Australia in the 1700s, sketches of this unusual creature were made and sent back to England whereupon they were considered by experts to be a hoax. Indeed, the incredible collection of its body parts – broad, flat tail, rubbery snout, webbed feet and short dense fur – make it one of the world's most unusual animals.

Officially classified as a mammal, the egg-laying platypus is mostly active during the night, a nocturnal animal. As if this combination of characteristics and behaviours were not unusual enough, the platypus is the only Australian mammal known to be venomous. The male platypus has a sharply pointed, moveable spur on its hind foot which delivers a poison capable of killing smaller animals and causing severe pain to humans. The spur – about 2 centimetres in length – is quite similar to the fang of a snake and, if provoked, is used as a means of defence. Those who have been stung by a platypus' spur report an immediate swelling around the wound followed by increased swelling throughout the affected limb. Excruciating, almost paralysing pain in the affected area accompanies the sting which, in some victims, has been known to last for a period of months. One report from a victim who was stung in the palm of the hand states that "...the spur could not be pulled out of the hand until the platypus was killed." During the breeding season, the amount of venom in the male platypus increases. This has led some zoologists to theorise that the poisonous spur is primarily for asserting dominance amongst fellow-males. To be stung by a male platypus is a rare event with only a very small number of people being on the receiving end of this most reclusive creature.

In the same area of the hind foot where the male has the poisonous spur, the female platypus only develops two buds which drop off in their first year of life never to appear again. The female platypus produces a clutch of one to three eggs in late winter or spring, incubating them in an underground burrow. The eggs are 15-18 millimetres long and have a whitish, papery shell like those of lizards and snakes. The mother is believed to keep the eggs warm by placing

them between her lower belly and curled-up tail for a period of about 10 or 11 days as she rests in an underground nest made of leaves or other vegetation collected from the water. The baby platypus drinks a rich milk which is secreted from two round patches of skin midway along the mother's belly'. It is believed that a baby platypus feeds by slurping up milk with rhythmic sweeps of its stubby bill. When the juveniles first enter the water at the age of about four months, they are nearly (80-90%) as long as an adult. Male platypus do not help to raise the young.

In Australia, the platypus is officially classified as 'Common but Vulnerable'. As a species, it is not currently considered to be endangered. However, platypus populations are believed to have declined or disappeared in many catchments, particularly in urban and agricultural landscapes. In most cases, the specific underlying reasons for the reduction in numbers remain unknown. Platypus surveys have only been carried out in a few catchments in eastern Australia. It is therefore impossible to provide an accurate estimate of the total number of platypus remaining in the wild. Based on recent studies, the average platypus population density along relatively good quality streams in the foothills of Victoria's Great Dividing Range is only around one to two animals per kilometre of channel. Because platypus are predators near the top of the food chain and require large amounts of food to survive (up to about 30% of a given animal's body weight each day), it is believed that their numbers are most often limited by the availability of food, mainly in the form of bottom-dwelling aquatic invertebrates such as shrimps, worms, yabbies, pea-shell mussels, and immature and adult aquatic insects. Small frogs and fish eggs are also eaten occasionally, along with some terrestrial insects that fall into the water from overhanging vegetation.

Catchments are an area of land drained by a creek or river system, or a place set aside for collecting water which runs off the surface of the land.

Until the early twentieth century, platypus were widely killed for their fur. The species is now protected by law throughout Australia. Platypus are wild animals with specialised living requirements. It is illegal for members of the public to keep them in captivity. A platypus which has been accidentally captured along a stream or found wandering in an unusual place should never

be taken home and treated as a pet, even for a brief time. The animal will not survive the experience. Only a small number of Australian zoos and universities hold a permit to maintain platypus in captivity for legitimate display or research purposes. Current Australian government policy does not allow this species to be taken overseas for any reason.

Use **NO MORE THAN THREE WORDS** for each answer.

Write your answers in boxes 10-13 on your answer sheet.

1. Even though the platypus is not endangered, it is considered 10 _____
2. Platypus numbers in 11 _____ areas have declined in many catchments.
3. Platypus numbers are low which is probably due to a lack of 12 _____
4. Platypus captivity for research and study purposes requires a 13 _____

Source: <http://ieltsionlinetests.com/>, *AUSTRALIA'S PLATYPUS*

Practice 10

ILLEGAL DOWNLOADS

A Downloading music from the internet has become a simple, fast and easy thing to do. The correct or legal way of going about it seems to be ignored by those who find it too costly. Illegal music downloads have reached an all time high, and a recent survey of high school students revealed an estimated 3.6 billion songs being downloaded per month. There are now endless possibilities available to the public where music can be downloaded for free and people are choosing to take this route even though it is illegal. iTunes is one of the most well known sites where music can be bought legally for just over 51 per track. So when it is this cheap, why are people still going to alternative unauthorized sites? Or is the legal route still considered a costly way to go about it?

B If you think that copying music results in simply a slap on the wrist, think twice. Under government law, record companies are entitled to \$750 to \$30,000 per infringement but the law allows the jury to increase that to as

much as \$150,000 per song if it finds the infringements were deliberate. The music industry has threatened about 35,000 people with charges of copyright Infringement over the past decade. In recent months there have been more cases of music piracy heading to the courts. The industry estimates that more than a hundred of these cases remain unsettled in court, with fewer than 10 offenders actively arguing the case against them. The penalties for breaching the copyright act differ slightly depending upon whether the infringing is for commercial or private financial gain, with the latter punishment being far milder.

C Nonetheless, the potential gain from illegal downloading versus the punitive measures that can be taken are, in many cases, poles apart. Recently, an American woman shared 27 illegally downloaded songs with her friends and was ordered to pay \$1.92 million to the record company for deliberate infringement of the companies' copyrights. More recently in America a 12 year old girl was sued for downloading music illegally and could face a penalty of \$1150 per song. The order of payment from the courts to the American woman who shared the 27 tracks with her friends has sparked controversy as the public disagree with the ordered Infringement. The woman shared 27 songs at \$1.99 per song, so should she be liable to pay such a large and impossible amount?

D It has also been noted that of all measures that can be taken, fining is actually the least likely method of preventing further abuse. With driving, for example, statistics have shown that those that repeatedly drive over the speed limit are not discouraged by the loss of a sum of money, but this attitude quickly changed when the penalty was possibly losing their driving licence or even spending time in prison.

E Being a difficult thing to police, the music industry has decided that it would be much easier to go after the internet service provider than to try and track down each individual case. The music industry feels internet piracy has decreased their artists' sales dramatically and is a danger to their business, although on the other hand, online music sales promote individual tracks to be sold rather than albums, therefore increasing the amount spent by the purchaser.

F If there are so many issues around the downloading of music, you might wonder why sales of MP3 players and CD burners are increasing rapidly. The answer is simple – these devices do have a legitimate purpose defined as ‘fair use’. You can choose to make your personal back-up copy to use in a MP3 player, or you may visit one of many web sites, like iTunes, which offers music that you pay for as you download. While some may wonder why you would pay for something that can be had for free, those who do prefer to obey the copyright protection laws have purchased over 150 million songs from the iTunes site alone.

G Online music sales are a business just like any other and music companies are fighting to salvage their industry. Cary Sherman, the President of RIAA (Recording Industry Association of America), stated that when your product is being regularly stolen, there comes a time when you have to take appropriate action. At the same time, the RIAA has offered amnesty to the illegal downloader who decide to come forward and agree to stop illegally downloading music over the Internet. People who have already been sued are obviously not eligible for amnesty.

H When high school students were asked how they felt about the business of downloading illegally from the net, they appeared to be divided on the issue. Some seemed to think there was absolutely nothing wrong with it, others felt that it should be thought of as a serious crime like any other form of theft.

Answer the questions below using **NO MORE THAN THREE WORDS AND/OR A NUMBER** from the passage for each answer.

Write your answers in boxes 17 – 20 on your answer sheet.

1. The maximum fine that a record company can impose is 17 _____
2. The penalty for breaking copyright laws is harsher when undertaken for 18 _____ benefit.
3. The music industry targets each 19 _____ rather than each specific person downloading illegally.

4. Appliances used in connection with illegal downloads are sold under the term 20 _____

Source: <http://ieltsontinetests.com/>, *ILLEGAL DOWNLOADS*

Summary Completion

DEFINITION:

A **summary** is a brief statement or restatement of main points, especially as a conclusion to a work.

Summary questions will therefore be the gist or crux of the passage in a whole or part.

There shall be more details in the passage, while the questions will include only the main points.

TWO TYPES OF SUMMARIES:

Type 1 - Choose the correct word from the text. The words will be found together and sometimes within a sentence.

Type 2 - Choose the correct word from a preselected list. The words might be different from the ones in the passage.

For type 2, there would be more options than the number of blanks.

Strategy

1. Read the instructions very carefully taking particular note of the word limit for your answers.
2. Read the questions and try to understand what is being asked.
3. Underline key words in the questions. Also, think about possible synonyms for them. Predict the correct answer.

Don't worry if there are unfamiliar words. If they also appear in the text, you may be able to work them out in context.

4. Skim/Scan read the text. Be alert for the keywords and synonyms you identified.

5. Go back and re-read question 1, then scan the first paragraph, maybe the second as well, until you find the location of the answer. Then read in detail to find the exact word or words you need to answer the question. Once you've found the answer, check if it fits into the statement grammatically and doesn't exceed the word limit.
6. Repeat this process for each of the questions.

TIPS

You should complete statements that paraphrase sentences from the text. Questions follow the order of the text.

For type 2- the options will be synonymous, or may be relevant to the blank. You must check the part of speech of the word first.

IN-CLASS CONTENT

Exercise 1

Air Rage

The first recorded case of an airline passenger turning seriously violent during a flight, a phenomenon now widely known as "air rage", happened in 1947 on a flight from Havana to Miami. A drunk man assaulted another passenger and bit a flight attendant. However, the man escaped punishment because it was not then clear under whose legal control a crime committed on a plane was, the country where the plane was registered or the country where the crime was committed. In 1963, at a Tokyo convention, it was decided that the laws of the country where the plane is registered take precedence.

The frequency of air rage has expanded out of proportion to the growth of air travel. Until recently few statistics were gathered about air rage, but those that have been indicate that passengers are increasingly likely to cause trouble or engage in violent acts. For example, in 1983 there were 226 air rage incidents out of approximately four million passengers, a 400% increase from 1995. In the same period American Airlines showed a 200% rise. Air travel is

predicted to rise by 5% internationally by 2010 leading to increased airport congestion. This, coupled with the flying public's increased aggression, means that air rage may become a major issue in coming years.

Aside from discomfort and disruption, air rage poses some very real dangers to flying. The most extreme of these is when out of control passengers enter the cockpit. This has actually happened on a number of occasions, the worst of which have resulted in the death and injury of pilots or the intruder taking control of the plane, almost resulting in crashes. In addition, berserk passengers sometimes attempt to open the emergency doors while in flight, putting the whole aircraft in danger. These are extreme examples and cases of air rage more commonly result in physical assaults on fellow passengers and crew such as throwing objects, punching, stabbing, or scalding with hot coffee.

The first time that an (1) of air rage was recorded was in the 1940s, but the passenger was never actually charged for an offence because there were no clear rules in place to specify where to prosecute. It was later (2) that it would be the country where the plane is registered. Air rage has (3) significantly since this time, growing by a staggering 400% from 1995 to 1998. Air rage is (4) to be a major problem in the future as air travel increases, as do levels of aggression. An angry (5) can put everyone in danger including the pilots, the crew and the other passengers, with some form of (6) being the most common consequence.

Predicted	Rose	Incident
Traveler	Found	Violence
Established	Occurring	Hoped
Increased	Injury	Vagabond

Source: <https://www.ieltsbuddy.com>, *Air Rage*

Exercise 2

The History of Thai Food

Thai food is internationally famous. Whether chili hot or comparatively bland, harmony and contrast are the guiding principles behind each dish. Thai cuisine is essentially a marriage of centuries-old Eastern and Western influences harmoniously combined into something uniquely Thai. Characteristics of Thai food depend on who cooks it and where it is cooked. Dishes can be refined and adjusted to suit all tastes.

Originally, Thai cooking reflected the characteristics of a waterborne lifestyle. Aquatic animals, plants, and herbs were major ingredients. With their Buddhist background, Thais shunned the use of large pieces of meat. Big cuts were shredded and blended with herbs and spices. Traditional Thai cooking methods were stewing and baking, or grilling but Chinese influences saw the introduction of frying, stir-frying and deep-frying. Chilies and other ingredients were introduced to Thai cooking by Portuguese missionaries who had acquired a taste of South American culinary while working there during the late 1600s. Culinary techniques from 17th century onwards were adopted from the world over, especially from Portugal, Netherlands, France and Japan. Thais were very adept at adapting foreign cooking methods and substituting ingredients. Coconut milk was substituted for other dairy products.

Overpowering pure spices were toned down and enhanced by fresh herbs such as lemongrass and galangal. Eventually, fewer and less spices were used in Thai curries, while the use of fresh herbs increased. It is generally acknowledged that Thai curries burn intensely, but briefly, whereas other curries, with strong spices, burn for longer periods. Instead of serving dishes in courses, a Thai meal is served all at once, permitting diners to enjoy complementary combinations of different tastes.

Questions 1 - 10

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Although the main tenets of every meal are 1 and 2, the final taste is determined by who cooks it. At first, the ingredients used in Thai cooking were the result of a 3 way of life. Cooking techniques became more varied thanks to the 4 Thai ingredients started to become more eclectic with the introduction of products from South America such as 5 Further change began in the 17th century through the influence of people from various countries such as 6 and 7 and the substitution of 8 with 9 One main difference between Thai curries and those from other countries is that the latter burn for 10

Source: <https://www.ieltsdeal.com>, *The History of Thai Food*

Exercise 3

‘The Cambridge Encyclopedia of Language’, David Crystal, 3rd Edition, © Cambridge University Press, 2010.

The instructions accompanying do-it-yourself products are regularly cited as a source of unnecessary expense or frustration. Few companies seem to test their instructions by having them followed by a first-time user. Often, essential information is omitted, steps in the construction process are taken for granted, and some degree of special knowledge is assumed. This is especially worrying in any field where failure to follow correct procedures can be dangerous.

Objections to material in plain English have come mainly from the legal profession. Lawyers point to the risk of ambiguity inherent in the use of everyday language for legal or official documents, and draw attention to the need for confidence in legal formulations, which can come only from using language that has been tested in courts over the course of centuries. The campaigners point out that there has been no sudden increase in litigation as a consequence of the increase in plain English materials.

Similarly, professionals in several different fields have defended their use of technical and complex language as being the most precise means of expressing technical or complex ideas. This is undoubtedly true: scientists, doctors, bankers and others need their jargon in order to communicate with each other succinctly and unambiguously. But when it comes to addressing the non-specialist consumer, the campaigners argue, different criteria must apply.

Questions 1 – 5 Complete the summary below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Consumers often complain that they experience a feeling of 1 when trying to put together do-it-yourself products which have not been tested by companies on a 2 In situations where not keeping to the correct procedures could affect safety issues, it is especially important that 3 information is not left out and no assumptions are made about a stage being self-evident or the consumer having a certain amount of 4 Lawyers, however, have raised objections to the use of plain English. They feel that it would result in ambiguity in documents and cause people to lose faith in 5 , as it would mean departing from language that has been used in the courts for a very long time.

Source: <https://www.ielts.org>, *The Cambridge Encyclopedia of Language*

Exercise 4

'This Marvellous Invention'

Of all mankind's manifold creations, language must take pride of place. Other inventions – the wheel, agriculture, sliced bread – may have transformed our material existence, but the advent of language is what made us human.

Compared to language, all other inventions pale in significance, since everything we have ever achieved depends on language and originates from it. Without language, we could never have embarked on our ascent to unparalleled power over all other animals, and even over nature itself.

But language is foremost not just because it came first. In its own right it is a tool of extraordinary sophistication, yet based on an idea of ingenious simplicity: 'this marvellous invention of composing out of twenty-five or thirty sounds that infinite variety of expressions which, whilst having in themselves no likeness to what is in our mind, allow us to disclose to others its whole secret, and to make known to those who cannot penetrate it all that we imagine, and all the various stirrings of our soul'. This was how, in 1660, the renowned French grammarians of the Port-Royal abbey near Versailles distilled the essence of language, and no one since has celebrated more eloquently the magnitude of its achievement. Even so, there is just one flaw in all these hymns of praise, for the homage to language's unique accomplishment conceals a simple yet critical incongruity. Language is mankind's greatest invention – except, of course, that it was never invented. This apparent paradox is at the core of our fascination with language, and it holds many of its secrets.

Questions 1 – 4 Complete the summary using the list of words, A-G below. Write the correct letter, A-G, in boxes 1-4 on your answer sheet.

The importance of language The wheel is one invention that has had a major impact on **1**..... aspects of life, but no impact has been as **2** as that of language. Language is very **3** yet composed of just a small number of sounds. Language appears to be **4**..... to use. However, its sophistication is often overlooked.

A difficult **B** complex **C** original **D** admired
E material **F** easy **G** fundamental

Source: <https://www.ielts.org/>, *This Marvellous Invention*

Practice Exercises

Practice 1

Striking Back at Lightning With Lasers

Seldom is the weather more dramatic than when thunderstorms strike. Their electrical fury inflicts death or serious injury on around 500 people each year in the United States alone. As the clouds roll in, a leisurely round of golf can become a terrifying dice with death – out in the open, a lone golfer may be a lightning bolt's most inviting target. And there is damage to property too. Lightning damage costs American power companies more than \$100 million a year.

But researchers in the United States and Japan are planning to hit back. Already in laboratory trials they have tested strategies for neutralising the power of thunderstorms, and this winter they will brave real storms, equipped with an armoury of lasers that they will be pointing towards the heavens to discharge thunderclouds before lightning can strike.

The idea of forcing storm clouds to discharge their lightning on command is not new. In the early 1960s, researchers tried firing rockets trailing wires into thunderclouds to set up an easy discharge path for the huge electric charges that these clouds generate. The technique survives to this day at a test site in Florida run by the University of Florida, with support from the Electrical Power Research Institute (EPRI), based in California. EPRI, which is funded by power companies, is looking at ways to protect the United States' power grid from lightning strikes. 'We can cause the lightning to strike where we want it to using rockets,' says Ralph Bernstein, manager of lightning projects at EPRI. The rocket site is providing precise measurements of lightning voltages and allowing engineers to check how electrical equipment bears up.

Bad behaviour

But while rockets are fine for research, they cannot provide the protection from lightning strikes that everyone is looking for. The rockets cost around \$1,200 each, can only be fired at a limited frequency and their failure rate is about 40 per cent. And even when they do trigger lightning, things still do not always go according to plan. 'Lightning is not perfectly well behaved,' says Bernstein. 'Occasionally, it will take a branch and go someplace it wasn't supposed to go.'

And anyway, who would want to fire streams of rockets in a populated area? 'What goes up must come down,' points out Jean-Claude Diels of the University of New Mexico. Diels is leading a project, which is backed by EPRI, to try to use lasers to discharge lightning safely

– and safety is a basic requirement since no one wants to put themselves or their expensive equipment at risk. With around \$500,000 invested so far, a promising system is just emerging from the laboratory.

The idea began some 20 years ago, when high-powered lasers were revealing their ability to extract electrons out of atoms and create ions. If a laser could generate a line of ionisation in the air all the way up to a storm cloud, this conducting path could be used to guide lightning to Earth, before the electric field becomes strong enough to break down the air in an uncontrollable surge. To stop the laser itself being struck, it would not be pointed straight at the clouds. Instead it would be directed at a mirror, and from there into the sky. The mirror would be protected by placing lightning conductors close by. Ideally, the cloud-zapper (gun) would be cheap enough to be installed around all key power installations, and portable enough to be taken to international sporting events to beam up at brewing storm clouds.

A stumbling block

However, there is still a big stumbling block. The laser is no nifty portable: it's a monster that takes up a whole room. Diels is trying to cut down the size and says that a laser around the size of a small table is in the offing. He plans to test this more manageable system on live thunderclouds next summer.

Bernstein says that Diels's system is attracting lots of interest from the power companies. But they have not yet come up with the \$5 million that EPRI says will be needed to develop a commercial system, by making the lasers yet smaller and cheaper. 'I cannot say I have money yet, but I'm working on it,' says Bernstein. He reckons that the forthcoming field tests will be the turning point – and he's hoping for good news. Bernstein predicts 'an avalanche of interest and support' if all goes well. He expects to see cloud-zappers eventually costing \$50,000 to \$100,000 each.

Other scientists could also benefit. With a lightning 'switch' at their fingertips, materials scientists could find out what happens when mighty currents meet matter. Diels also hopes to see the birth of 'interactive meteorology' – not just forecasting the weather but controlling it. 'If we could discharge clouds, we might affect the weather,' he says.

And perhaps, says Diels, we'll be able to confront some other meteorological menaces. 'We think we could prevent hail by inducing lightning,' he says. Thunder, the shock wave that comes from a lightning flash, is thought to be the trigger for the torrential rain that is typical of storms. A laser thunder factory could shake the moisture out of clouds, perhaps preventing the formation of the giant hailstones that threaten crops. With luck, as the storm clouds gather this winter, laser-toting researchers could, for the first time, strike back.

Questions 7–10

Complete the summary using the list of words, **A–I**, below.

Write the correct letter, **A–I**, in boxes 7–10 on your answer sheet.

In this method, a laser is used to create a line of ionisation by removing electrons from **7** This laser is then directed at **8** in order to control electrical charges, a method which is less dangerous than using **9** As a protection for the lasers, the beams are aimed firstly at **10**

- | | | |
|------------------------|---------------------|-----------------------|
| A cloud-zappers | B atoms | C storm clouds |
| D mirrors | E technique | F ions |
| G rockets | H conductors | I thunder |

Explanation for Q 7: -

APPLY THE TIPS AS TAUGHT ABOVE:

Read the question > underline the key words > find it in the passage

7. Since you read the sentence, now quickly locate where the “line of ionisation”.

You will find it in 6th para: “The idea began some 20 years ago, when high-powered lasers were revealing their ability to extract electrons out of atoms and create ions. If a laser could generate a line of ionisation in the air”. **Extract electrons out of atoms generate**” means the laser is able to remove electrons from atoms.

This means that a laser was used to create a line of ionization by removing electrons from atoms. Therefore, B is the answer.

Source: Cambridge Book 8

Practice 2

THE LITTLE ICE AGE

A

This book will provide a detailed examination of the Little Ice Age and other climatic shifts, but, before I embark on that, let me provide a historical context. We tend to think of climate - as opposed to weather - as something unchanging, yet humanity has been at the mercy of climate change for its entire existence, with at least eight glacial episodes in the past 730,000 years. Our ancestors adapted to the universal but irregular global warming since the end of the last great Ice Age, around 10,000 years ago, with dazzling opportunism. They developed strategies for surviving harsh drought cycles, decades of heavy rainfall or unaccustomed cold; adopted agriculture and stock-raising, which revolutionised human life; and founded the world's first pre-industrial civilisations in Egypt, Mesopotamia and the Americas. But the price of sudden climate change, in famine, disease and suffering, was often high.

B

The Little Ice Age lasted from roughly 1300 until the middle of the nineteenth century. Only two centuries ago, Europe experienced a cycle of bitterly cold winters; mountain glaciers in the Swiss Alps were the lowest in recorded memory, and pack ice surrounded Iceland for much of the year. The climatic events of the Little Ice Age did more than help shape the modern world. They are the deeply important context for the current unprecedented global warming. The Little Ice Age was far from a deep freeze, however; rather an irregular seesaw of rapid climatic shifts, few lasting more than a quarter-century, driven by complex and still little understood interactions between the atmosphere and the ocean. The seesaw brought cycles of intensely cold winters and easterly winds, then switched abruptly to years of heavy spring and early summer rains, mild winters, and frequent Atlantic storms, or to periods of droughts, light northeasterly winds, and summer heat waves.

C

Reconstructing the climate changes of the past is extremely difficult, because systematic weather observations began only a few centuries ago, in Europe and North America. Records from India and tropical Africa are even more recent. For the time before records began, we have only 'proxy records' reconstructed largely from tree rings and ice cores, supplemented by a few incomplete written accounts. We now have hundreds of tree-ring records from throughout the northern hemisphere, and many from south of the equator, too, amplified with a growing body of temperature data from ice cores drilled in Antarctica, Greenland, the Peruvian Andes, and other locations. We are close to a knowledge of annual summer and winter temperature variations over much of the northern hemisphere going back 600 years.

D

This book is a narrative history of climatic shifts during the past ten centuries, and some of the ways in which people in Europe adapted to them. Part One describes the Medieval Warm Period, roughly 900 to 1200. During these three centuries, Norse voyagers from Northern Europe explored northern seas, settled Greenland, and visited North America. It was not a time of uniform warmth, for then, as always since the Great Ice Age, there were constant shifts in rainfall and temperature. Mean European temperatures were about the same as today, perhaps slightly cooler.

E

It is known that the Little Ice Age cooling began in Greenland and the Arctic in about 1200. As the Arctic ice pack spread southward, Norse voyages to the west were rerouted into the open Atlantic, then ended altogether. Storminess increased in the North Atlantic and North Sea. Colder, much wetter weather descended on Europe between 1315 and 1319, when thousands perished in a continent-wide famine. By 1400, the weather had become decidedly more unpredictable and stormier, with sudden shifts and lower temperatures that culminated in the cold decades of the late sixteenth century. Fish were a vital commodity in growing towns and cities, where food supplies were a constant

concern. Dried cod and herring were already the staples of the European fish trade, but changes in water temperatures forced fishing fleets to work further offshore. The Basques, Dutch, and English developed the first offshore fishing boats adapted to a colder and stormier Atlantic. A gradual agricultural revolution in northern Europe stemmed from concerns over food supplies at a time of rising populations. The revolution involved intensive commercial farming and the growing of animal fodder on land not previously used for crops. The increased productivity from farmland made some countries self-sufficient in grain and livestock and offered effective protection against famine.

F

Global temperatures began to rise slowly after 1850, with the beginning of the Modern Warm Period. There was a vast migration from Europe by land-hungry farmers and others, to which the famine caused by the Irish potato blight contributed, to North America, Australia, New Zealand, and southern Africa. Millions of hectares of forest and woodland fell before the newcomers' axes between 1850 and 1890, as intensive European farming methods expanded across the world. The unprecedented land clearance released vast quantities of carbon dioxide into the atmosphere, triggering for the first time humanly caused global warming. Temperatures climbed more rapidly in the twentieth century as the use of fossil fuels proliferated and greenhouse gas levels continued to soar. The rise has been even steeper since the early 1980s. The Little Ice Age has given way to a new climatic regime, marked by prolonged and steady warming. At the same time, extreme weather events like Category 5 hurricanes are becoming more frequent.

Questions 18–22

Complete the summary using the list of words, A–I, below.

Write the correct letter, A–I, in boxes 18–22 on your answer sheet.

Weather during the Little Ice Age

Documentation of past weather conditions is limited: our main sources of knowledge of conditions in the distant past are **18** and **19** We can deduce that the Little Ice Age was a time of **20** , rather than of consistent freezing. Within it there were some periods of very cold winters, others of **21** and heavy rain, and yet others that saw **22** with no rain at all.

- | | | |
|--------------------------|-----------------------|-------------------------------|
| A climatic shifts | B ice cores | C tree rings |
| D glaciers | E interactions | F weather observations |
| G heat waves | H storms | I written accounts |

Source: Cambridge Book 8

Practice 3

Attitudes to language

It is not easy to be systematic and objective about language study. Popular linguistic debate regularly deteriorates into invective and polemic. Language belongs to everyone, so most people feel they have a right to hold an opinion about it. And when opinions differ, emotions can run high. Arguments can start as easily over minor points of usage as over major policies of linguistic education.

Language, moreover, is a very public behaviour, so it is easy for different usages to be noted and criticised. No part of society or social behaviour is exempt: linguistic factors influence how we judge personality, intelligence, social status, educational standards, job aptitude, and many other areas of identity and social survival. As a result, it is easy to hurt, and to be hurt, when language use is unfeelingly attacked.

In its most general sense, prescriptivism is the view that one variety of language has an inherently higher value than others, and that this ought to be imposed on the whole of the speech community. The view is propounded especially in relation to grammar and vocabulary, and frequently with reference to pronunciation. The variety which is favoured, in this account, is usually a version of the 'standard' written language, especially as encountered in literature, or in the formal spoken language which most closely reflects this style. Adherents to this variety are said to speak or write 'correctly'; deviations from it are said to be 'incorrect'.

All the main languages have been studied prescriptively, especially in the 18th century approach to the writing of grammars and dictionaries. The aims of these early grammarians were threefold: (a) they wanted to codify the principles of their languages, to show that there was a system beneath the apparent chaos of usage, (b) they wanted a means of settling disputes over usage, and (c) they wanted to point out what they felt to be common errors, in order to 'improve' the language. The authoritarian nature of the approach is best characterised by its reliance on 'rules' of grammar. Some usages are 'prescribed', to be learnt and followed accurately; others are 'proscribed', to be avoided. In this early period, there were no half-measures: usage was either right or wrong, and it was the task of the grammarian not simply to record alternatives, but to pronounce judgement upon them.

These attitudes are still with us, and they motivate a widespread concern that linguistic standards should be maintained. Nevertheless, there is an alternative point of view that is concerned less with standards than with the *facts* of linguistic usage. This approach is summarised in the statement that it is the task of the grammarian to *describe*, not *prescribe* – to record the facts of linguistic diversity, and not to attempt the impossible tasks of evaluating language variation or halting language change. In the second half of the 18th century, we already find advocates of this view, such as Joseph Priestley, whose *Rudiments of English Grammar* (1761) insists that 'the custom of speaking is the original and only just standard of any language.' Linguistic issues, it is argued, cannot be solved by logic and legislation. And this view has become the tenet of the modern linguistic approach to grammatical analysis.

In our own time, the opposition between 'descriptivists' and 'prescriptivists' has often become extreme, with both sides painting unreal pictures of the other. Descriptive grammarians have been presented as people who do not care about standards, because of the way they see all forms of usage as equally valid. Prescriptive grammarians have been presented as blind adherents to a historical tradition. The opposition has even been presented in quasi-political terms – of radical liberalism vs elitist conservatism.

Questions 9–12

Complete the summary using the list of words, **A–I**, below.

Write the correct letter, **A–I**, in boxes 9–12 on your answer sheet.

The language debate

According to **9**, there is only one correct form of language. Linguists who take this approach to language place great importance on grammatical **10**

Conversely, the view of **11**, such as Joseph Priestley, is that grammar should be based on **12**

- | | | |
|---------------------------|---------------------------|-------------------------|
| A descriptivists | B language experts | C popular speech |
| D formal language | E evaluation | F rules |
| G modern linguists | H prescriptivists | I change |

Source: Cambridge Book 9

Practice 4

Young children's sense of identity

- A** A sense of self develops in young children by degrees. The process can usefully be thought of in terms of the gradual emergence of two somewhat separate features: the *self as a subject*, and the *self as an object*. William James introduced the distinction in 1892, and contemporaries of his, such as Charles Cooley, added to the developing debate. Ever since then psychologists have continued building on the theory.
- B** According to James, a child's first step on the road to self-understanding can be seen as the recognition that he or she exists. This is an aspect of the self that he labelled 'self-as-subject', and he gave it various elements. These included an awareness of one's own agency (i.e. one's power to act), and an awareness of one's distinctiveness from other people. These features gradually emerge as infants explore their world and interact with caregivers. Cooley (1902) suggested that a sense of the self-as-subject was primarily concerned with being able to exercise power. He proposed that the earliest examples of this are an infant's attempts to control physical objects, such as toys or his or her own limbs. This is followed by attempts to affect the behaviour of other people. For example, infants learn that when they cry or smile someone responds to them.
- C** Another powerful source of information for infants about the effects they can have on the world around them is provided when others mimic them. Many parents spend a lot of time, particularly in the early months, copying their infant's vocalizations and expressions. In addition, young children enjoy looking in mirrors, where the movements they can see are dependent upon their own movements. This is not to say that infants recognize the reflection as their *own* image (a later development). However, Lewis and Brooks-Gunn (1979) suggest that infants' developing understanding that the movements they see in the mirror are contingent on their own, leads to a growing awareness that they are distinct from other people. This is because they, and only they, can change the reflection in the mirror.
- D** This understanding that children gain of themselves as active agents continues to develop in their attempts to co-operate with others in play. Dunn (1988) points out that it is in such day-to-day relationships and interactions that the child's understanding of his- or herself emerges. Empirical investigations of the self-as-subject in young children are, however, rather scarce because of difficulties of communication: even if young infants can reflect on their experience, they certainly cannot express this aspect of the self directly.

- E** Once children have acquired a certain level of self-awareness, they begin to place themselves in a whole series of categories, which together play such an important part in defining them uniquely as 'themselves'. This second step in the development of a full sense of self is what James called the 'self-as-object'. This has been seen by many to be the aspect of the self which is most influenced by social elements, since it is made up of social roles (such as student, brother, colleague) and characteristics which derive their meaning from comparison or interaction with other people (such as trustworthiness, shyness, sporting ability).
- F** Cooley and other researchers suggested a close connection between a person's own understanding of their identity and other people's understanding of it. Cooley believed that people build up their sense of identity from the reactions of others to them, and from the view they believe others have of them. He called the self-as-object the 'looking-glass self', since people come to see themselves as they are reflected in others. Mead (1934) went even further, and saw the self and the social world as inextricably bound together: 'The self is essentially a social structure, and it arises in social experience ... it is impossible to conceive of a self arising outside of social experience.'
- G** Lewis and Brooks-Gunn argued that an important developmental milestone is reached when children become able to recognize themselves visually without the support of seeing contingent movement. This recognition occurs around their second birthday. In one experiment, Lewis and Brooks-Gunn (1979) dabbed some red powder on the noses of children who were playing in front of a mirror, and then observed how often they touched their noses. The psychologists reasoned that if the children knew what they usually looked like, they would be surprised by the unusual red mark and would start touching it. On the other hand, they found that children of 15 to 18 months are generally not able to recognize themselves unless other cues such as movement are present.
- H** Finally, perhaps the most graphic expressions of self-awareness in general can be seen in the displays of rage which are most common from 18 months to 3 years of age. In a longitudinal study of groups of three or four children, Bronson (1975) found that the intensity of the frustration and anger in their disagreements increased sharply between the ages of 1 and 2 years. Often, the children's disagreements involved a struggle over a toy that none of them had played with before or after the tug-of-war: the children seemed to be disputing ownership rather than wanting to play with it. Although it may be less marked in other societies, the link between the sense of 'self' and of 'ownership' is a notable feature of childhood in Western societies.

Questions 24–26

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Write your answers in boxes 24–26 on your answer sheet.

How children acquire a sense of identity

First, children come to realise that they can have an effect on the world around them, for example by handling objects, or causing the image to move when they face a **24** This aspect of self-awareness is difficult to research directly, because of **25** problems.

Secondly, children start to become aware of how they are viewed by others. One important stage in this process is the visual recognition of themselves which usually occurs when they reach the age of two. In Western societies at least, the development of self awareness is often linked to a sense of **26** , and can lead to disputes.

Source: Cambridge Book 9

Practice 5

Museums of fine art and their public

The fact that people go to the Louvre museum in Paris to see the original painting Mona Lisa when they can see a reproduction anywhere leads us to question some assumptions about the role of museums of fine art in today's world.

One of the most famous works of art in the world is Leonardo da Vinci's Mona Lisa. Nearly everyone who goes to see the original will already be familiar with it from reproductions, but they accept that fine art is more rewardingly viewed in its original form.

However, if Mona Lisa was a famous novel, few people would bother to go to a museum to read the writer's actual manuscript rather than a printed reproduction. This might be explained by the fact that the novel has evolved

precisely because of technological developments that made it possible to print out huge numbers of texts, whereas oil paintings have always been produced as unique objects. In addition, it could be argued that the practice of interpreting or 'reading' each medium follows different conventions. With novels, the reader attends mainly to the meaning of words rather than the way they are printed on the page, whereas the 'reader' of a painting must attend just as closely to the material form of marks and shapes in the picture as to any ideas they may signify.

Yet it has always been possible to make very accurate facsimiles of pretty well any fine art work. The seven surviving versions of Mona Lisa bear witness to the fact that in the 16th century, artists seemed perfectly content to assign the reproduction of their creations to their workshop apprentices as regular 'bread and butter' work. And today the task of reproducing pictures is incomparably more simple and reliable, with reprographic techniques that allow the production of high-quality prints made exactly to the original scale, with faithful colour values, and even with duplication of the surface relief of the painting.

But despite an implicit recognition that the spread of good reproductions can be culturally valuable, museums continue to promote the special status of original work.

Unfortunately, this seems to place severe limitations on the kind of experience offered to visitors.

One limitation is related to the way the museum presents its exhibits. As repositories of unique historical objects, art museums are often called 'treasure houses'. We are reminded of this even before we view a collection by the presence of security guards, attendants, ropes and display cases to keep us away from the exhibits. In many cases, the architectural style of the building further reinforces that notion. In addition, a major collection like that of London's National Gallery is housed in numerous rooms, each with dozens of works, any one of which is likely to be worth more than all the average visitor possesses. In a society that judges the personal status of the individual so much by their material worth, it is therefore difficult not to be impressed by one's own relative 'worthlessness' in such an environment.

Furthermore, consideration of the 'value' of the original work in its treasure house setting impresses upon the viewer that, since these works were originally produced, they have been assigned a huge monetary value by some person or institution more powerful than themselves. Evidently, nothing the viewer thinks about the work is going to alter that value, and so today's viewer is deterred from trying to extend that spontaneous, immediate, self-reliant kind of reading which would originally have met the work.

The visitor may then be struck by the strangeness of seeing such diverse paintings, drawings and sculptures brought together in an environment for which they were not originally created. This 'displacement effect' is further heightened by the sheer volume of exhibits. In the case of a major collection, there are probably more works on display than we could realistically view in weeks or even months.

This is particularly distressing because time seems to be a vital factor in the appreciation of all art forms. A fundamental difference between paintings and other art forms is that there is no prescribed time over which a painting is viewed. By contrast, the audience encourages an opera or a play over a specific time, which is the duration of the performance. Similarly, novels and poems are read in a prescribed temporal sequence, whereas a picture has no clear place at which to start viewing, or at which to finish. Thus, artworks themselves encourage us to view them superficially, without appreciating the richness of detail and labour that is involved.

Consequently, the dominant critical approach becomes that of the art historian, a specialised academic approach devoted to 'discovering the meaning' of art within the cultural context of its time. This is in perfect harmony with the museum's function, since the approach is dedicated to seeking out and conserving 'authentic', original readings of the exhibits. Again, this seems to put paid to that spontaneous, participators' criticism which can be found in abundance in criticism of classic works of literature, but is absent from most art history.

The displays of art museums serve as a warning of what critical practices can emerge when spontaneous criticism is suppressed. The museum public, like any other audience, experience art more rewardingly when given the

confidence to express their views. If appropriate works of fine art could be rendered permanently accessible to the public by means of high-fidelity reproductions, as literature and music already are, the public may feel somewhat less in awe of them. Unfortunately, that may be too much to ask from those who seek to maintain and control the art establishment.

Questions 27-31

Complete the summary using the list of words, **A-L**, below.

Write the correct letter, **A-L**, in boxes 27-31 on your answer sheet.

The value attached to original works of art

People go to art museums because they accept the value of seeing an original work of art. But they do not go to museums to read original manuscripts of novels, perhaps because the availability of novels has depended on **27** _____ for so long, and also because with novels, the **28** _____ are the most important thing.

However, in historical times artists such as Leonardo were happy to instruct **29** _____ to produce copies of their work and these days new methods of reproduction allow excellent replication of surface relief features as well as colour and **30** _____

It is regrettable that museums still promote the superiority of original works of art, since this may not be in the interests of the **31** _____

A institution **B** mass production **C** mechanical processes
D public **E** paints **F** artist **G** size **H** underlying ideas
I basic technology **J** readers **K** picture frames **L** assistants

Source: Cambridge Book 10

Practice 6

Beyond the blue horizon

Ancient voyagers who settled the far-flung islands of the Pacific Ocean

(1)

An important archaeological discovery on the island of Efate in the Pacific archipelago of Vanuatu has revealed traces of an ancient seafaring people, the distant ancestors of today's Polynesians. The site came to light only by chance. An agricultural worker, digging in the grounds of a derelict plantation, scraped open a grave – the first of dozens in a burial ground some 3,000 years old. It is the oldest cemetery ever found in the Pacific islands, and it harbors the remains of an ancient people archaeologists call the Lapita.

(2)

They were daring blue-water adventurers who used basic canoes to rove across the ocean. But they were not just explorers. They were also pioneers who carried with them everything they would need to build new lives – their livestock, taro seedlings and stone tools. Within the span of several centuries, the Lapita stretched the boundaries of their world from the jungle-clad volcanoes of Papua New Guinea to the loneliest coral outliers of Tonga.

(3)

The Lapita left precious few clues about themselves, but Efate expands the volume of data available to researchers dramatically. The remains of 62 individuals have been uncovered so far, and archaeologists were also thrilled to find six complete Lapita pots. Other items included a Lapita burial urn with modeled birds arranged on the rim as though peering down at the human remains sealed inside. 'It's an important discovery,' says Matthew Spriggs, professor of archaeology at the Australian National University and head of the international team digging up the site, 'for it conclusively identifies the remains as Lapita.'

(4)

DNA teased from these human remains may help answer one of the most

puzzling questions in Pacific anthropology: did all Pacific islanders spring from one source or many? Was there only one outward migration from a single point in Asia, or several from different points? 'This represents the best opportunity we've had yet,' says Spriggs, 'to find out who the Lapita actually were, where they came from, and who their closest descendants are today.'

(5)

There is one stubborn question for which archaeology has yet to provide any answers: how did the Lapita accomplish the ancient equivalent of a moon landing, many times over? No-one has found one of their canoes or any rigging, which could reveal how the canoes were sailed. Nor do the oral histories and traditions of later Polynesians offer any insights, for they turn into myths long before they reach as far back in time as the Lapita.

(6)

'All we can say for certain is that the Lapita had canoes that were capable of ocean voyages, and they had the ability to sail them,' says Geoff Irwin, a professor of archaeology at the University of Auckland. Those sailing skills, he says, were developed and passed down over thousands of years by earlier mariners who worked their way through the archipelagoes of the western Pacific, making short crossings to nearby islands. The real adventure didn't begin, however, until their Lapita descendants sailed out of sight of land, with empty horizons on every side. This must have been as difficult for them as landing on the moon is for us today. Certainly it distinguished them from their ancestors, but what gave them the courage to launch out on such risky voyages?

(7)

The Lapita's thrust into the Pacific was eastward, against the prevailing trade winds, Irwin notes. Those nagging headwinds, he argues, may have been the key to their success. 'They could sail out for days into the unknown and assess the area, secure in the knowledge that if they didn't find anything, they could turn about and catch a swift ride back on the trade winds. This is what would have made the whole thing work.' Once out there, skilled seafarers would have detected abundant leads to follow to land: seabirds, coconuts and twigs carried out to sea by the tides, and the afternoon pile-up of clouds on the horizon which often indicates an island in the distance.

(8)

For returning explorers, successful or not, the geography of their own archipelagoes would have provided a safety net. Without this to go by, overshooting their home ports, getting lost and sailing off into eternity would have been all too easy. Vanuatu, for example, stretches more than 500 miles in a northwest-southeast trend, its scores of intervisible islands forming a backstop for mariners riding the trade winds home.

(9)

All this presupposes one essential detail, says Atholl Anderson, professor of prehistory at the Australian National University: the Lapita had mastered the advanced art of sailing against the wind. 'And there's no proof they could do any such thing,' Anderson says. 'There has been this assumption they made, and people have built canoes to recreate those early voyages based on that assumption. But nobody has any idea what their canoes looked like or how they were rigged.'

(10)

Rather than give all the credit to human skill, Anderson invokes the winds of chance. El Nino, the same climate disruption that affects the Pacific today, may have helped scatter the Lapita, Anderson suggests. He points out that climate data obtained from slow-growing corals around the Pacific indicate a series of unusually frequent El Ninos around the time of the Lapita expansion. By reversing the regular east-to-west flow of the trade winds for weeks at a time, these super El Ninos might have taken the Lapita on long unplanned voyages.

(11)

However they did it, the Lapita spread themselves a third of the way across the Pacific, then called it quits for reasons known only to them. Ahead lay the vast emptiness of the central Pacific and perhaps they were too thinly stretched to venture farther. They probably never numbered more than a few thousand in total, and in their rapid migration eastward they encountered hundreds of islands – more than 300 in Fiji alone.

Questions 27-31**Completing Summary**

Complete the summary using the list of words and phrases, **A-J**, below.

Write the correct letter, **A-J**, in boxes **27-31** on your sheet.

The Efate burial site

A 3,000-year-old burial ground of seafaring people called the Lapita has been found on an abandoned **27** _____ on the Pacific island of Efate.

The cemetery, which is a significant **28** _____, was uncovered accidentally by an agricultural worker.

The Lapita explored and colonised many Pacific islands over several centuries. They took many things with them on their voyages including **29** _____ and tools.

The burial ground increases the amount of information about the Lapita available to scientists. A team of researchers, led by Matthew Spriggs from the Australian National University, are helping with the excavation of the site. Spriggs believes the **30** _____ which was found at the site is very important since it confirms that the **31** _____ found inside are Lapita.

A proof

B plantation

C harbour

D bones

E data

F archaeological discovery

G burial urn

H source

I animals

J maps

Source: Cambridge Book 10

Practice 7

It's Only a Cockroach

I turn on the light in my kitchen that night, and then I see it. I draw back, and my first instinct is to scream. I control myself with difficulty, but find myself shuddering, unable to deal with the creature before me. It's only a cockroach, but its large size, long antennae, shiny appearance, and spiny legs, all present a particularly disgusting appearance. And this is not just to me, but to everyone it seems, even to the point of phobic responses.

This is certainly the overriding reason I want these creatures totally eradicated from my apartment, but with their offensive odour, passive transportation of microbes, and trails of droppings, they also pose a distinct threat to domestic hygiene. Clearly, cohabitation is not possible. So, I do all I can to keep these pests away. Food is stored in sealed containers, garbage cans have tight lids, my kitchen is kept spotlessly clean, and my apartment swept and mopped nightly. I have also sealed up possible entry points, but still, these loathsome things find their way inside. I need a way to kill them.

The most precise cockroach killer is, typically, another insect. A specific species of wasp targets these creatures. With a quick accurate swoop, it bites the cockroach at the main nerve centre of its body, which results in a temporary paralysis. This is very necessary, as we all know just how fast cockroaches can run. The wasp has only a few minutes to prepare its next sting, in the exact area of the brain which controls the cockroaches' instinct to escape. After the paralysis departs, the cockroach is subdued and docile, and doomed. The wasp bites off the antennae to further discourage flight, then drags its victim away.

Faced with such predation, cockroaches usually conceal themselves during the day, and with their ability to flatten their bodies, they can disappear into just about any tiny nook, crevice, and cranny. There, they wait patiently for darkness before emerging to search for food, and will usually run away when exposed to light. Given this, I am told that the slim and agile house centipede is probably the most effective cockroach predator, able to track down and root out the most carefully hidden prey. Unfortunately, I would say that centipedes are even more disgusting to have in one's house, if that's possible. I just can't win this game.

Can anyone win? These insects are just about the hardest on the planet. Some can wait for up to three months before meals, some can survive on the barest hint of nutrition (such as the glue on the back of postage stamps), and some can live without air for over half an hour. They do not, however, handle cold weather well, preferring the warm conditions and security found within buildings.

Hidden there, the female lays egg capsules containing around 40 eggs, and with the insect's relatively long lifespan (about a year), some 300 to 400 offspring can ultimately be produced. The result: once these insects have infested a building, they are very difficult to eradicate.

Cockroaches do, however, have some subtleties. They leave chemical messages in their droppings, as well as emit airborne pheromones to signal other cockroaches about sources of food and water, and alert them to their own presence. The latter is more important, for these insects are actually somewhat gregarious. Research has shown that cockroaches make group-based decisions, and tend to cooperate. One study placed a large number of cockroaches in a dish with three small shelters, and the insects divided themselves equally between two of them, leaving the third one empty. When these shelters were exchanged for two very large ones, all the cockroaches arranged themselves in just one. These creatures, it seems, prefer the company of others, and a rather fair allocation of resources.

Should I therefore feel any admiration? It is hard - in fact, in Western culture, cockroaches are almost universally depicted as repulsive and dirty pests. In the insect's most famous literary appearance - Franz Kafka's 'The Metamorphosis' - a man, Gregor, is transformed overnight into a monstrous insect, probably a cockroach (although the story never quite makes that clear). Gregor's transformation results in very predictable responses from his family and friends, who can never accept him again. He eventually dies, outcast and lonely, despised and mistreated - a potent symbol of alienation and rejection. Yet in the Pixar animated feature 'Wall-E', a cockroach provides essential companionship to a lone robot living on a planet scorched by a nuclear holocaust.

Whatever the case, I am faced with a big problem: a large ugly cockroach crawling slowly across my sink, antennae waving as it explores around. If I try to grab it, it will dart away, and I doubt whether I'll be able to catch it before it disappears into the numerous cracks and crevices of my old apartment. So, I carefully remove my slipper, determined to squash the insect, but then almost scream again as it lifts on its legs, raises membranous wings, and with a loud buzzing noise, flies away. Oh, just what I need, they can fly, too.

Complete the summary of the second half of the passage.

Choose **ONE WORD** from the passage for each answer.

Cockroaches use **9** _____ in the air to communicate, and show a willingness to **10** _____, yet the author struggles to feel **11** _____ for these insects.

Source: <http://ieltsonline-tests.com/>, *It's Only a Cockroach*

Practice 8

The Pearl

A The pearl has always had a special status in the rich and powerful all through the history. For instance, women from ancient Rome went to bed with pearls on them, so that they could remind themselves how wealthy they were after waking up. Pearls used to have more commercial value than diamonds until jewellers learnt to cut gems. In the eastern countries like Persia, ground pearl powders could be used as a medicine to cure anything including heart diseases and epilepsy.

B Pearls can generally be divided into three categories: natural, cultured and imitation. When an irritant (such as a grain of sand) gets inside a certain type of oyster, mussel, or clam, the mollusc will secrete a fluid as a means of defence to coat the irritant. Gradually, layers are accumulated around the irritant until a lustrous natural pearl is formed.

C A cultured pearl undergoes the same process. There is only one difference between cultured pearls and natural ones: in cultured pearls, the irritant is a bead called 'mother of pearl' and is placed in the oyster through surgical implantation. This results in much larger cores in cultivated pearls than those in natural pearls. As long as there are enough layers of nacre (the secreted fluid covering the irritant) to create a gorgeous, gem-quality pearl; the size of the nucleus wouldn't make a difference to beauty or durability.

D Pearls can come from both salt and freshwater sources. Typically, pearls from salt water usually have high quality, although several freshwater pearls are considered high in quality, too. In addition, freshwater pearls often have irregular shapes, with a puffed rice appearance. Nevertheless, it is the individual merits that determine the pearl's value more than the sources of pearls. Saltwater pearl oysters are usually cultivated in protected lagoons or volcanic atolls, while most freshwater cultured pearls sold today come from China. There are a number of options for producing cultured pearls: use fresh water or sea water shells, transplant the graft into the mantle or into the gonad, add a spherical bead or do it non-beaded.

E No matter which method is used to get pearls, the process usually takes several years. Mussels must reach a mature age, which may take up to almost three years, and then be transplanted as an irritant. When the irritant is put in place, it takes approximately another three years for a pearl to reach its full size. Sometimes, the irritant may be rejected. As a result, the pearl may be seriously deformed, or the oyster may directly die from such numerous complications as diseases. At the end of a 5- to 10-year cycle, only half of the oysters may have made it through. Among the pearls that are actually produced in the end, only about 5% of them will be high-quality enough for the jewellery makers.

F Imitation pearls are of another different story. The Island of Mallorca in Spain is renowned for its imitation pearl industry. In most cases, a bead is dipped into a solution made from fish scales. But this coating is quite thin and often wears off. One way to distinguish the imitation pearls is to have a bite on it. Fake pearls glide through your teeth, while the layers of nacre on the real pearls feel gritty.

G Several factors are taken into account to evaluate a pearl: size, shape, colour,

the quality of surface and luster. Generally, the three types of pearls come in such order (with the value decreasing): natural pearls, cultured pearls and imitation pearls (which basically are worthless). For jewellers, one way to tell whether a pearl is natural or cultured is to send it to a gem lab and perform an X-ray on it. High-quality natural pearls are extremely rare. Japan's Akoya pearls are one of the glossiest pearls out there, while the south sea water of Australia is a cradle to bigger pearls.

H Historically, the pearls with the highest quality around the globe are found in the Persian Gulf, particularly around Bahrain. These pearls have to be hand-harvested by divers with no advanced equipment. Unfortunately, when the large reserve of oil was discovered in the early 1930s, Persian Gulf's natural pearl industry came to a sudden end because the contaminated water destroyed the once pristine pearls. In the present days, India probably has the largest stock of natural pearls. However, it is quite an irony that a large part of India's stock of natural pearls are originally from Bahrain.

Complete the summary below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 5-10 on your answer sheet.

In history, pearls have had great importance within the men of wealth and power, which were treated as gems for women in **5** _____. Also, pearls were even used as a medicine for people in **6** _____. There are essentially three types of pearls: natural, cultured and imitation. Most freshwater cultured pearls sold today come from China while **7** _____ Island is famous for its imitation pearl industry. Good-quality natural pearls are exceedingly unusual.

8 _____ often manufactures some of the glitteriest pearls while **9** _____ produces larger size ones due to the favourable environment along the coastline. In the past, **10** _____ in Persian Gulf produced the world's best pearls. Nowadays, the major remaining suppliers of natural pearls belong to India.

Source: <http://ieltsionlinetests.com/>, *The Pearl*

Practice 9

Elephant Communication

O' Connell-Rodwell, a postdoctoral fellow at Stanford University, has travelled to Namibia's first-ever wildlife reserve to explore the mystical and complicated realm of elephant communication. She, along with her colleagues, is part of a scientific revolution that started almost 20 years ago. This revolution has made a stunning revelation: elephants are capable of communicating with each other over long distances with low-frequency sounds, also known as infrasounds, which are too deep for humans to hear.

As might be expected, African elephants able to detect seismic sound may have something to do with their ears. The hammer bone in an elephant's inner ear is proportionally huge for a mammal, but it is rather normal for animals that use vibrational signals. Thus, it may be a sign that suggests elephants can use seismic sounds to communicate.

Other aspects of elephant anatomy also support that ability. First, their massive bodies, which enable them to give out low-frequency sounds almost as powerful as the sound a jet makes during takeoff, serve as ideal frames for receiving ground vibrations and transmitting them to the inner ear. Second, the elephant's toe bones are set on a fatty pad, which might be of help when focusing vibrations from the ground into the bone. Finally, the elephant has an enormous brain that sits in the cranial cavity behind the eyes in line with the auditory canal. The front of the skull is riddled with sinus cavities, which might function as resonating chambers for ground vibrations.

It remains unclear how the elephants detect such vibrations, but O' Connell-Rodwell raises a point that the pachyderms are 'listening' with their trunks and feet instead of their ears. The elephant trunk may just be the most versatile appendage in nature. Its utilization encompasses drinking, bathing, smelling, feeding and scratching. Both trunk and feet contain two types of nerve endings that are sensitive to pressure – one detects infrasonic vibration, and another responds to vibrations higher in frequencies. As O' Connell-Rodwell sees, this research has a boundless and unpredictable future. 'Our work is really

interfaced with geophysics, neurophysiology and ecology,' she says. 'We're raising questions that have never even been considered before.'

It has been well-known to scientists that seismic communication is widely observed among small animals, such as spiders, scorpions, insects and quite a lot of vertebrate species like white-lipped frogs, blind mole rats, kangaroo rats and golden moles. Nevertheless, O'Connell-Rodwell first argued that a giant land animal is also sending and receiving seismic signals. 'I used to lay a male planthopper on a stem and replay the calling sound of a female, and then the male one would exhibit the same kind of behaviour that happens in elephants—he would freeze, then press down on his legs, move forward a little, then stay still again. I find it so fascinating, and it got me thinking that perhaps auditory communication is not the only thing that is going on.'

Scientists have confirmed that an elephant's capacity to communicate over long distances is essential for survival, especially in places like Etosha, where more than 2,400 savanna elephants range over a land bigger than New Jersey. It is already difficult for an elephant to find a mate in such a vast wild land, and the elephant reproductive biology only complicates it. Breeding herds also adopt low-frequency sounds to send alerts regarding predators. Even though grown-up elephants have no enemies other than human beings, baby elephants are vulnerable and are susceptible to lions and hyenas attack. At the sight of a predator, older ones in the herd will clump together to form protection before running away.

We now know that elephants can respond to warning calls in the air, but can they detect signals transmitted solely through the ground? To look into that matter, the research team designed an experiment in 2002, which used electronic devices that enabled them to give out signals through the ground at Mushara. 'The outcomes of our 2002 study revealed that elephants could indeed sense warning signals through the ground,' O'Connell-Rodwell observes.

Last year, an experiment was set up in the hope of solving that problem. It used three different recordings—the 1994 warning call from Mushara, an anti-predator call recorded by scientist Joyce Poole in Kenya and a made-up warble tone. 'The data I've observed to this point implies that the elephants were

responding the way I always expected. However, the fascinating finding is that the anti-predator call from Kenya, which is unfamiliar to them, caused them to gather around, tense up and rumble aggressively as well—but they didn't always flee. I didn't expect the results to be that clear-cut.'

Complete the summary below.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

Write your answers in **boxes 32-38** on your answer sheet.

How the elephants sense these sound vibrations is still unknown, but O'Connell-Rodwell, a postdoctoral researcher at Stanford University, proposes that elephants are 'listening' with their **32** _____ by two kinds of nerve endings that respond to vibrations with both **33** _____ frequency and slightly higher frequencies. O'Connell-Rodwell's work is at the combination of geophysics, neurophysiology and **34** _____. It was known that seismic communication existed extensively within small animals, but O'Connell-Rodwell was the first person to indicate that a large land animal would send and receive **35** _____ too. Also, he noticed the freezing behaviour by putting a male planthopper on a stem and play back a female call, which might prove the existence of other communicative approaches besides **36** _____. Scientists have determined that an elephant's ability to communicate over long distances is essential, especially, when elephant herds are finding a **37** _____, or are warning of predators. Finally, the results of our 2002 study showed us that elephants could detect warning calls through the **38** _____

Source: <http://ieltsionlinetests.com/>, *Elephant Communication*

Practice 10

AUSTRALIA'S PLATYPUS

Of all the creatures on the earth, the Australian platypus, *Ornithorhynchus paradoxus*, is perhaps one of the most mysterious and reclusive. Derived from the Latin *platys* meaning 'flat and broad' and *pous* meaning 'foot', the platypus has long been an iconic symbol of Australia. Upon being discovered in Australia in the 1700s, sketches of this unusual creature were made and sent back to England whereupon they were considered by experts to be a hoax. Indeed, the incredible collection of its body parts – broad, flat tail, rubbery snout, webbed feet and short dense fur – make it one of the world's most unusual animals.

Officially classified as a mammal, the egg-laying platypus is mostly active during the night, a nocturnal animal. As if this combination of characteristics and behaviours were not unusual enough, the platypus is the only Australian mammal known to be venomous. The male platypus has a sharply pointed, moveable spur on its hind foot which delivers a poison capable of killing smaller animals and causing severe pain to humans. The spur – about 2 centimetres in length – is quite similar to the fang of a snake and, if provoked, is used as a means of defence. Those who have been stung by a platypus' spur report an immediate swelling around the wound followed by increased swelling throughout the affected limb. Excruciating, almost paralysing pain in the affected area accompanies the sting which, in some victims, has been known to last for a period of months. One report from a victim who was stung in the palm of the hand states that "...the spur could not be pulled out of the hand until the platypus was killed." During the breeding season, the amount of venom in the male platypus increases. This has led some zoologists to theorise that the poisonous spur is primarily for asserting dominance amongst fellow-males. To be stung by a male platypus is a rare event with only a very small number of people being on the receiving end of this most reclusive creature.

In the same area of the hind foot where the male has the poisonous spur, the female platypus only develops two buds which drop off in their first year of life never to appear again. The female platypus produces a clutch of one to three

eggs in late winter or spring, incubating them in an underground burrow. The eggs are 15-18 millimetres long and have a whitish, papery shell like those of lizards and snakes. The mother is believed to keep the eggs warm by placing them between her lower belly and curled-up tail for a period of about 10 or 11 days as she rests in an underground nest made of leaves or other vegetation collected from the water. The baby platypus drinks a rich milk which is secreted from two round patches of skin midway along the mother's belly'. It is believed that a baby platypus feeds by slurping up milk with rhythmic sweeps of its stubby bill. When the juveniles first enter the water at the age of about four months, they are nearly (80-90%) as long as an adult. Male platypus do not help to raise the young.

In Australia, the platypus is officially classified as 'Common but Vulnerable'. As a species, it is not currently considered to be endangered. However, platypus populations are believed to have declined or disappeared in many catchments¹, particularly in urban and agricultural landscapes. In most cases, the specific underlying reasons for the reduction in numbers remain unknown. Platypus surveys have only been carried out in a few catchments in eastern Australia. It is, therefore, impossible to provide an accurate estimate of the total number of platypus remaining in the wild. Based on recent studies, the average platypus population density along relatively good quality streams in the foothills of Victoria's Great Dividing Range is only around one to two animals per kilometre of channel. Because platypus are predators near the top of the food chain and require large amounts of food to survive (up to about 30% of a given animal's body weight each day), it is believed that their numbers are most often limited by the availability of food, mainly in the form of bottom-dwelling aquatic invertebrates such as shrimps, worms, yabbies, pea-shell mussels, and immature and adult aquatic insects. Small frogs and fish eggs are also eaten occasionally, along with some terrestrial insects that fall into the water from overhanging vegetation.

Catchments are an area of land drained by a creek or river system, or a place set aside for collecting water which runs off the surface of the land.

Until the early twentieth century, platypus were widely killed for their fur. The species is now protected by law throughout Australia. Platypus are wild animals

with specialised living requirements. It is illegal for members of the public to keep them in captivity. A platypus which has been accidentally captured along a stream or found wandering in an unusual place should never be taken home and treated as a pet, even for a brief time. The animal will not survive the experience. Only a small number of Australian zoos and universities hold a permit to maintain platypus in captivity for legitimate display or research purposes. Current Australian government policy does not allow this species to be taken overseas for any reason.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

Write your answers in **boxes 6-9** on your answer sheet.

Male and Female Platypus

Platypus are unique Australian animals. Although all platypuses share many similarities, the male and female are somewhat different from each other. For example, on the hind feet, the male has a **6** _____ while the young female has **7** _____.

In the **8** _____ the mother keeps her eggs warm and, once born, supplies her **9** _____. On the other hand, the male platypus does not help raise the young at all.

Source: <http://ieltsonline-tests.com/>, AUSTRALIA'S PLATYPUS

Multiple Choice Questions

Definitions:

Multiple choice questions appear regularly in both the Academic and General IELTS Reading tests. They are fairly simple to complete but it's easy to get tricked into picking the wrong answer.

There are three different types of MCQ questions. You will either have to:

1. choose one answer out of four options
2. choose two answers out of five options
3. choose three answers out of six options

The first option is the most common.

Strategy

1. Read the questions carefully.
2. Read the choices and underline any keywords and think about any synonyms that might appear in the text. Think about the difference in meaning between the different choices.
3. Skim and scan the text using keywords and synonyms to locate the part containing the answers.
4. Read that part of the text in detail, very carefully, thinking about the difference in meanings.
5. Think about not only which options are correct but how the other options are wrong.
6. Go back and read the question again and mark your final choice.

IN-CLASS CONTENT

Exercise 1

Sir Isaac Newton and Alchemy

Sir Isaac Newton is most famous for the quantification of gravitational attraction, discovering that white light is actually a mixture of immutable

spectral colors, and the formulation calculus. However, it is less well documented that Newton spent 30 years engaged in the study of the mysterious art of alchemy, or as it was more commonly known then, chymistry. Only a tiny fraction of Newton's work on alchemy has been published but he wrote around a million words on the subject, including laboratory notes, indexes of alchemical substances and transcripts from other sources. On his death in 1727, Newton had over 100 manuscripts filled with alchemical material, sold by auctioneers Sotheby's as part of a larger collection in 1936. This side of Newton was often an embarrassment to his admirers. His first biographer, John Conduitt, like many commentators who followed, played down the role of alchemy (and other pursuits) in Newton's work, stating:

"When he was tired with his severe studies his only relief and amusement was going to some other subjects such as History and Chronology or Divinity and Chymistry ". Just how important the study of alchemy was to Newton only began to be recognized in 1947, when John Maynard Keynes, who bought much of the work from Sotheby's, declared in his essay, "Newton, the Man "; " Newton was not the first of the age of reason. He was the last of the magicians

Questions 1- 4 Choose the correct letter, A, B, or C.

1. Newton realized that white light was made up of different what?

- A colors
- B mixtures
- C immutable

2. What was alchemy originally called?

- A mysterious
- B chymistry
- C an art

3. Many thought Newton was what?

- A tired
- B an embarrassment
- C admired

4. What did Keynes call Newton?

- A old
- B reasonable
- C a magician

Source: <https://www.ieltsanswers.com/>, *Sir Isaac Newton and Alchemy*

Exercise 2

Research in the USA

Section A

The role of governments in environmental management is difficult but inescapable. Sometimes, the state tries to manage the resources it owns, and does so badly. Often, however, governments act in an even more harmful way. They actually subsidise the exploitation and consumption of natural resources. A whole range of policies, from farm-price support to protection for coal-mining, do environmental damage and (often) make no economic sense. Scrapping them offers a two-fold bonus: a cleaner environment and a more efficient economy. Growth and environmentalism can actually go hand in hand, if politicians have the courage to confront the vested interest that subsidies create.

Section B

No activity affects more of the earth's surface than farming. It shapes a third of the planet's land area, not counting Antarctica, and the proportion is rising. World food output per head has risen by 4 per cent between the 1970s and 1980s mainly as a result of increases in yields from land already in cultivation, but also because more land has been brought under the plough. Higher yields have been achieved by increased irrigation, better crop breeding, and a doubling in the use of pesticides and chemical fertilisers in the 1970s and 1980s.

Section C

All these activities may have damaging environmental impacts. For example,

land clearing for agriculture is the largest single cause of deforestation; chemical fertilisers and pesticides may contaminate water supplies; more intensive farming and the abandonment of fallow periods tend to exacerbate soil erosion; and the spread of monoculture and use of high-yielding varieties of crops have been accompanied by the disappearance of old varieties of food plants which might have provided some insurance against pests or diseases in future. Soil erosion threatens the productivity of land in both rich and poor countries. The United States, where the most careful measurements have been done, discovered in 1982 that about one-fifth of its farmland was losing topsoil at a rate likely to diminish the soil's productivity. The country subsequently embarked upon a program to convert 11 per cent of its cropped land to meadow or forest. Topsoil in India and China is vanishing much faster than in America.

Section D

Government policies have frequently compounded the environmental damage that farming can cause. In rich countries, subsidies for growing crops and price supports for farm output drive up the price of land. The annual value of these subsidies is immense: about \$250 billion, or more than all World Bank lending in the 1980s. To increase the output of crops per acre, a farmer's easiest option is to use more of the most readily available inputs: fertilisers and pesticides. Fertiliser use doubled in Denmark in the period 1960-1985 and increased in The Netherlands by 150 per cent. The quantity of pesticides applied has risen too: by 69 per cent in 1975-1984 in Denmark, for example, with a rise of 115 per cent in the frequency of application in the three years from 1981. In the late 1980s and early 1990s some efforts were made to reduce farm subsidies. The most dramatic example was that of New Zealand, which scrapped most farm support in 1984. A study of the environmental effects, conducted in 1993, found that the end of fertiliser subsidies had been followed by a fall in fertiliser use (a fall compounded by the decline in world commodity prices, which cut farm incomes). The removal of subsidies also stopped land-clearing and over-stocking, which in the past had been the principal causes of erosion. Farms began to diversify. The one kind of subsidy whose removal appeared to have been bad for the environment was the subsidy to manage soil erosion.

In less enlightened countries, and in the European Union, the trend has been to reduce rather than eliminate subsidies, and to introduce new payments to encourage farmers to treat their land in environmentally friendlier ways, or to leave it fallow. It may sound strange but such payments need to be higher than the existing incentives for farmers to grow food crops. Farmers, however, dislike being paid to do nothing. In several countries they have become interested in the possibility of using fuel produced from crop residues either as a replacement for petrol (as ethanol) or as fuel for power stations (as biomass). Such fuels produce far less carbon dioxide than coal or oil, and absorb carbon dioxide as they grow. They are therefore less likely to contribute to the greenhouse effect. But they are rarely competitive with fossil fuels unless subsidised - and growing them does no less environmental harm than other crops.

10. Research completed in 1982 found that in the United States soil erosion

- A reduced the productivity of farmland by 20 per cent.
- B was almost as severe as in India and China.
- C was causing significant damage to 20 percent of farmland.
- D could be reduced by converting cultivated land to meadow or forest.

11. By the mid-1980s, farmers in Denmark

- A used 50 per cent less fertiliser than Dutch farmers.
- B used twice as much fertiliser as they had in 1960.
- C applied fertiliser much more frequently than in 1960.
- D more than doubled the amount of pesticide they used in just 3 years.

12. Which one of the following increased in New Zealand after 1984?

- A farm incomes
- B use of fertiliser
- C over-stocking
- D farm diversification

Source: <https://www.ieltsdeal.com>, *Research in the USA*

Exercise 3

Ants secrete aphid tranquilizer from their feet

Ants and aphids are known to have a complex relationship. The aphids provide the ants with a food source, the sugar-rich honeydew they excrete when eating plants and, in return, the ants protect the aphids from ladybirds and other insects that prey on them.

To ensure a constant supply of honeydew, some ant species cultivate large numbers of aphids, and prevent them from straying too far from the colony by biting and damaging, or even completely removing, their wings. The ants also secrete a chemical from their mandibles which inhibits wing development in juvenile aphids.

Ants communicate with each other using a large repertoire of chemical signals, which are actively secreted onto surfaces from exocrine glands on the legs. These signals can recruit nest-mates to food sources, and are also used to mark a colony's territory. Ants secrete chemicals passively too. As an ant moves, hydrocarbons are shed from the cuticle (the waterproof outer lining of the exoskeleton), leaving a chemical trail.

Ants use behavioural signals called semiochemicals to manipulate aphids' nervous systems. (Ant's own behaviour can be manipulated too, by parasitic fungi.) Earlier work had shown that the presence of ants can somehow tranquilize aphids and limit their motor functions, but whether or not this required direct contact between the ants and aphids was unclear.

Using digital video cameras to measure their walking speeds, Tom Oliver of Imperial College London, and colleagues from Royal Holloway and the University of Reading have now shown that aphids move much more slowly on paper that had previously been walked on by ants than on plain paper. They believe that the chemicals laid down in the ants' footprints are used to maintain an aphid "farm" near the ant colony.

Maintaining a populous aphid farm in a small area is obviously beneficial to the

ants, as it would provide them with large quantities of honeydew. However, the relationship between the two species is complex, and it seems that the ants 'manipulation of the aphids' behavior is exploitative.

Normally, aphids wander off to new locations when conditions become crowded, to establish new populations nearby. And although ant-attended aphid populations are bigger and live longer than those not attended by ants, the ants prevent the aphid dispersal that is necessary to maintain a stable meta-population, and makes the aphids more vulnerable to parasites.

Questions 1 - 5 Choose the correct letter, A, B, C or D.

1. How do ants ensure they have regular supplies of honeydew?

- A they damage aphid's wings
- B aphids are made to secrete a chemical
- C they find more juvenile aphids
- D they bite their legs

2. How do ants affect aphids' nervous systems?

- A by using parasitic fungi
- B by touching their legs
- C by making a noise
- D by using chemicals

3. When do aphids walk more slowly?

- A when they walk on paper
- B when they are with other aphids
- C when they are on video
- D when they walk on chemicals secreted by ants

4. How can we best describe the relationship between the ants and aphids?

- A beneficial
- B win-win
- C exploitative
- D behavioral

Source: <https://scienceblogs.com/>, *Ants secrete aphid tranquilizer from their feet*

Exercise 4

Why does coffee shoot out of the lid of your cup?

You're running late for work and you've purchased your coffee in a hurry. Just as you arrive at the office, a jet of hot liquid escapes from the tiny hole in the lid, leaving you with hot beverage residue on your clothes before the day has really started.

This is exactly what happened to Rob Kaczmarek after buying a cup of his favorite caffeinated drink. The marketing director at Convergent Science was intrigued by why the coffee shoots out so far and therefore set about modeling this, initially as a joke for those who enjoy a bit of computational fluid dynamics. It's the design of the lid that's the problem, he explains.

"It happens because of the sloshing of the coffee against the lid, which is kind of unique. At the end of the lid, the hole is right up above that. As the coffee sloshes against the end of the lid, that velocity is amplified and it splashes up through the actual hole."

Not all coffee cups are designed with a hole, of course. Some have lids with a tiny hole and others peel back to reveal a much larger gap, which offsets the shooting jets of hot liquid.

1. What accident might occur at work in the morning, after you bought coffee?

- A You spill it all over the place accidentally.
- B You get burns from the hot coffee.
- C You contaminate your clothes with it.
- D Nothing out of the ordinary.

2. Rob Kaczmarek explains to us that: The coffee shoots out very far.

- A He set his experiment as a joke.
- B He was really intrigued by spilling the coffee.
- C Coffee spills because of the design of the lid.

3. The main reason coffee spills is:

- A Sloshing
- B Design of the cup
- C It is not stated

4. This text might be classified as:

- A Scientific
- B Humorous
- C Fictional
- D Romantic

Source: <https://ielts-up.com>, *Why does coffee shoot out of the lid of your cup?*

Practice Exercises

Practice 1

Making The Most Of Trends

Experts from Harvard Business School give advice to managers

Most managers can identify the major trends of the day. But in the course of conducting research in a number of industries and working directly with companies, we have discovered that managers often fail to recognize the less obvious but profound ways these trends are influencing consumers' aspirations, attitudes, and behaviors. This is especially true of trends that managers view as peripheral to their core markets.

Many ignore trends in their innovation strategies or adopt a wait-and-see approach and let competitors take the lead. At a minimum, such responses mean missed profit opportunities. At the extreme, they can jeopardize a company by ceding rivals the opportunity to transform the industry. The purpose of this article is twofold: to spur managers to think more expansively about how trends could engender new value propositions in their core markets, and to provide some high-level advice on how to make market research and product development personnel more adept at analyzing and exploiting trends.

One strategy, known as ‘infuse and augment’, is to design a product or service that retains most of the attributes and functions of existing products in the category but adds others that address the needs and desires unleashed by a major trend. A case in point is the Poppy range of handbags, which the firm Coach created in response to the economic downturn of 2008. The Coach brand had been a symbol of opulence and luxury for nearly 70 years, and the most obvious reaction to the downturn would have been to lower prices. However, that would have risked cheapening the brand’s image. Instead, they initiated a consumer-research project which revealed that customers were eager to lift themselves and the country out of tough times. Using these insights, Coach launched the lower-priced Poppy handbags, which were in vibrant colors, and looked more youthful and playful than conventional Coach products. Creating the sub-brand allowed Coach to avert an across-the-board price cut. In contrast to the many companies that responded to the recession by cutting prices, Coach saw the new consumer mindset as an opportunity for innovation and renewal.

A further example of this strategy was supermarket Tesco’s response to consumers’ growing concerns about the environment. With that in mind, Tesco, one of the world’s top five retailers, introduced its Greener Living program, which demonstrates the company’s commitment to protecting the environment by involving consumers in ways that produce tangible results. For example, Tesco customers can accumulate points for such activities as reusing bags, recycling cans and printer cartridges, and buying

home-insulation materials. Like points earned on regular purchases, these green points can be redeemed for cash. Tesco has not abandoned its traditional retail offering but augmented its business with these innovations, thereby infusing its value proposition with a green streak.

A more radical strategy is 'combine and transcend'. This entails combining aspects of the product's existing value proposition with attributes addressing changes arising from a trend, to create a novel experience – one that may land the company in an entirely new market space. At first glance, spending resources to incorporate elements of a seemingly irrelevant trend into one's core offerings sounds like it's hardly worthwhile. But consider Nike's move to integrate the digital revolution into its reputation for high-performance athletic footwear. In 2006, they teamed up with technology company Apple to launch Nike+, a digital sports kit comprising a sensor that attaches to the running shoe and a wireless receiver that connects to the user's iPod. By combining Nike's original value proposition for amateur athletes with one for digital consumers, the Nike+ sports kit and web interface moved the company from a focus on athletic apparel to a new plane of engagement with its customers.

A third approach, known as 'counteract and reaffirm', involves developing products or services that stress the values traditionally associated with the category in ways that allow consumers to oppose – or at least temporarily escape from – the aspects of trends they view as undesirable. A product that accomplished this is the ME2, a video game created by Canada's iToys. By reaffirming the toy category's association with physical play, the ME2 counteracted some of the widely perceived negative impacts of digital gaming devices. Like other handheld games, the device featured a host of exciting interactive games, a full-color LCD screen, and advanced 3D graphics. What set it apart was that it incorporated the traditional physical component of children's play: it contained a pedometer, which tracked and awarded points for physical activity (walking, running, biking, skateboarding, climbing stairs). The child could use the points to enhance various virtual skills needed for the video game. The ME2, introduced in mid-2008, catered to kids' huge

desire to play video games while countering the negatives, such as associations with lack of exercise and obesity.

Once you have gained perspective on how trend-related changes in consumer opinions and behaviors impact on your category, you can determine which of our three innovation strategies to pursue. When your category's basic value proposition continues to be meaningful for consumers influenced by the trend, the infuse-and-augment strategy will allow you to reinvigorate the category. If analysis reveals an increasing disparity between your category and consumers' new focus, your innovations need to transcend the category to integrate the two worlds. Finally, if aspects of the category clash with undesired outcomes of a trend, such as associations with unhealthy lifestyles, there is an opportunity to counteract those changes by reaffirming the core values of your category.

Trends – technological, economic, environmental, social, or political – that affect how people perceive the world around them and shape what they expect from products and services present firms with unique opportunities for growth.

Questions 27-31

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes 27-31 on your answer sheet.

27. In the first paragraph, the writer says that most managers

- A fail to spot the key consumer trends of the moment.
- B make the mistake of focusing only on the principal consumer trends.
- C misinterpret market research data relating to current consumer trends.
- D are unaware of the significant impact that trends have on consumers' lives.

Explanation for Q 27:-

Key words: first paragraph ,managers

In the first paragraph, the writer states that: “...managers often fail to recognize the less obvious but profound ways these trends are influencing consumers’ aspirations, attitudes, and behaviors”. We learn that “managers can identify the major trends of the day”, so Answer A is incorrect. However, managers are not good at understanding how these trends influence the lives of consumers. So, they are unaware of the significant impact that trends have on consumers’ lives.

– profound = significant

– influencing = impact on

The answer is D.

28. According to the third paragraph, Coach was anxious to

- A follow what some of its competitors were doing.
- B maintain its prices throughout its range.
- C safeguard its reputation as a manufacturer of luxury goods.
- D modify the entire look of its brand to suit the economic climate.

29. What point is made about Tesco’s Greener Living programme?

- A It did not require Tesco to modify its core business activities.
- B It succeeded in attracting a more eco-conscious clientele.
- C Its main aim was to raise consumers’ awareness of environmental issues.
- D It was not the first time that Tesco had implemented such an initiative.

30. What does the writer suggest about Nike’s strategy?

- A It was an extremely risky strategy at the time.
- B It was a strategy that only a major company could afford to follow.
- C It was the type of strategy that would not have been possible in the past.
- D It was the kind of strategy which might appear to have few obvious benefits.

31. What was original about the ME2?

- A It contained technology that had been developed for the sports industry.

B It appealed to young people who were keen to improve their physical fitness.

C It took advantage of a current trend for video games with colourful 3D graphic.

D It was a handheld game that addressed people's concerns about unhealthy lifestyles.

Source: Cambridge Book 13

Practice 2

Neuroaesthetics

An emerging discipline called neuroaesthetics is seeking to bring scientific objectivity to the study of art, and has already given us a better understanding of many masterpieces. The blurred imagery of Impressionist paintings seems to stimulate the brain's amygdala, for instance. Since the amygdala plays a crucial role in our feelings, that finding might explain why many people find these pieces so moving.

Could the same approach also shed light on abstract twentieth-century pieces, from Mondrian's geometrical blocks of colour, to Pollock's seemingly haphazard arrangements of splashed paint on canvas? Sceptics believe that people claim to like such works simply because they are famous. We certainly do have an inclination to follow the crowd. When asked to make simple perceptual decisions such as matching a shape to its rotated image, for example, people often choose a definitively wrong answer if they see others doing the same. It is easy to imagine that this mentality would have even more impact on a fuzzy concept like art appreciation, where there is no right or wrong answer.

Angelina Hawley-Dolan, of Boston College, Massachusetts, responded to this debate by asking volunteers to view pairs of paintings - either the creations of famous abstract artists or the doodles of infants, chimps and elephants. They then had to judge which they preferred. A third of the paintings were given no captions, while many were labelled incorrectly - volunteers might think they

were viewing a chimp's messy brush strokes when they were actually seeing an acclaimed masterpiece. In each set of trials, volunteers generally preferred the work of renowned artists, even when they believed it was by an animal or a child. It seems that the viewer can sense the artist's vision in paintings, even if they can't explain why.

Robert Pepperell, an artist based at Cardiff University, creates ambiguous works that are neither entirely abstract nor clearly representational. In one study, Pepperell and his collaborators asked volunteers to decide how powerful they considered an artwork to be, and whether they saw anything familiar in the piece. The longer they took to answer these questions, the more highly they rated the piece under scrutiny, and the greater their neural activity. It would seem that the brain sees these images as puzzles, and the harder it is to decipher the meaning, the more rewarding is the moment of recognition.

And what about artists such as Mondrian, whose paintings consist exclusively of horizontal and vertical lines encasing blocks of colour? Mondrian's works are deceptively simple, but eye-tracking studies confirm that they are meticulously composed, and that simply rotating a piece radically changes the way we view it. With the originals, volunteers' eyes tended to stay longer on certain places in the image, but with the altered versions they would flit across a piece more rapidly. As a result, the volunteers considered the altered versions less pleasurable when they later rated the work.

In a similar study, Oshin Vartanian of Toronto University asked volunteers to compare original paintings with ones which he had altered by moving objects around within the frame. He found that almost everyone preferred the original, whether it was a Van Gogh still life or an abstract by Miro. Vartanian also found that changing the composition of the paintings reduced activation in those brain areas linked with meaning and interpretation.

In another experiment, Alex Forsythe of the University of Liverpool analysed the visual intricacy of different pieces of art, and her results suggest that many artists use a key level of detail to please the brain. Too little and the work is boring, but too much results in a kind of 'perceptual overload', according to Forsythe. What's more, appealing pieces both abstract and representational,

show signs of 'fractals' - repeated motifs recurring in different scales, fractals are common throughout nature, for example in the shapes of mountain peaks or the branches of trees. It is possible that our visual system, which evolved in the great outdoors, finds it easier to process such patterns.

It is also intriguing that the brain appears to process movement when we see a handwritten letter, as if we are replaying the writer's moment of creation. This has led some to wonder whether Pollock's works feel so dynamic because the brain reconstructs the energetic actions the artist used as he painted. This may be down to our brain's 'mirror neurons', which are known to mimic others' actions. The hypothesis will need to be thoroughly tested, however. It might even be the case that we could use neuroaesthetic studies to understand the longevity of some pieces of artwork. While the fashions of the time might shape what is currently popular, works that are best adapted to our visual system may be the most likely to linger once the trends of previous generations have been forgotten.

It's still early days for the field of neuroaesthetics - and these studies are probably only a taste of what is to come. It would, however, be foolish to reduce art appreciation to a set of scientific laws. We shouldn't underestimate the importance of the style of a particular artist, their place in history and the artistic environment of their time. Abstract art offers both a challenge and the freedom to play with different interpretations. In some ways, it's not so different to science, where we are constantly looking for systems and decoding meaning so that we can view and appreciate the world in a new way.

Questions 1-4

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes 1-4 on your answer sheet.

1. In the second paragraph, the writer refers to a shape-matching test in order to illustrate

A the subjective nature of art appreciation.

B the reliance of modern art on abstract forms.

- C our tendency to be influenced by the opinions of others.
- D a common problem encountered when processing visual data.

2. Angelina Hawley-Dolan's findings indicate that people

- A mostly favour works of art which they know well.
- B hold fixed ideas about what makes a good work of art.
- C are often misled by their initial expectations of a work of art.
- D have the ability to perceive the intention behind works of art.

3. Results of studies involving Robert Pepperell's pieces suggest that people

- A can appreciate a painting without fully understanding it.
- B find it satisfying to work out what a painting represents.
- C vary widely in the time they spend looking at paintings.
- D generally prefer representational art to abstract art.

4. What do the experiments described in the fifth paragraph suggest about the paintings of Mondrian?

- A They are more carefully put together than they appear.
- B They can be interpreted in a number of different ways.
- C They challenge our assumptions about shape and colour.
- D They are easier to appreciate than many other abstract works.

Source: Cambridge Book 11

Practice 3

An Introduction to Film Sound

Though we might think of film as an essentially visual experience, we really cannot afford to underestimate the importance of film sound. A meaningful soundtrack is often as complicated as the image on the screen, and is ultimately just as much the responsibility of the director. The entire soundtrack consists of three essential ingredients: the human voice, sound effects and music. These three tracks must be mixed and balanced so as to produce the necessary emphases which in turn create desired effects.

Topics which essentially refer to the three previously mentioned tracks are discussed below. They include dialogue, synchronous and asynchronous sound effects, and music.

Let us start with dialogue. As is the case with stage drama, dialogue serves to tell the story and expresses feelings and motivations of characters as well. Often with film characterization the audience perceives little or no difference between the character and the actor. Thus, for example, the actor Humphrey Bogart is the character Sam Spade; film personality and life personality seem to merge. Perhaps this is because the very texture of a performer's voice supplies an element of character.

When voice textures fit the performer's physiognomy and gestures, a whole and very realistic persona emerges. The viewer sees not an actor working at his craft, but another human being struggling with life. It is interesting to note that how dialogue is used and the very amount of dialogue used varies widely among films. For example, in the highly successful science-fiction film 2001, little dialogue was evident, and most of it was banal and of little intrinsic interest. In this way the film-maker was able to portray what Thomas Sobochack and Vivian Sobochack call, in *An Introduction to Film*, the 'inadequacy of human responses when compared with the magnificent technology created by man and the visual beauties of the universe'.

The comedy *Bringing Up Baby*, on the other hand, presents practically non-stop dialogue delivered at breakneck speed. This use of dialogue underscores not

only the dizzy quality of the character played by Katherine Hepburn, but also the absurdity of the film itself and thus its humor. The audience is bounced from gag to gag and conversation to conversation; there is no time for audience reflection. The audience is caught up in a whirlwind of activity in simply managing to follow the plot. This film presents pure escapism - largely due to its frenetic dialogue.

Synchronous sound effects are those sounds which are synchronized or matched with what is viewed. For example, if the film portrays a character playing the piano, the sounds of the piano are projected. Synchronous sounds contribute to the realism of film and also help to create a particular atmosphere.

For example, the 'click' of a door being opened may simply serve to convince the audience that the image portrayed is real, and the audience may only subconsciously note the expected sound.

However, if the 'click' of an opening door is part of an ominous action such as a burglary, the sound mixer may call attention to the 'click' with an increase in volume; this helps to engage the audience in a moment of suspense.

Asynchronous sound effects, on the other hand, are not matched with a visible source of the sound on screen. Such sounds are included so as to provide an appropriate emotional nuance, and they may also add to the realism of the film. For example, a film-maker might opt to include the background sound of an ambulance's siren while the foreground sound and image portrays an arguing couple. The asynchronous ambulance siren underscores the psychic injury incurred in the argument; at the same time the noise of the siren adds to the realism of the film by acknowledging the film's city setting.

We are probably all familiar with background music in films, which has become so ubiquitous as to be noticeable in its absence. We are aware that it is used to add emotion and rhythm. Usually not meant to be noticeable, it often provides a tone or an emotional attitude toward the story and /or the characters depicted. In addition, background music often foreshadows a change in mood. For example, dissonant music may be used in film to indicate an approaching (but not yet visible) menace or disaster.

Background music may aid viewer understanding by linking scenes. For example, a particular musical theme associated with an individual character or situation may be repeated at various points in a film in order to remind the audience of salient motifs or ideas.

Film sound comprises conventions and innovations. We have come to expect an acceleration of music during car chases and creaky doors in horror films. Yet, it is important to note as well that sound is often brilliantly conceived. The effects of sound are often largely subtle and often are noted by only our subconscious minds. We need to foster an awareness of film sound as well as film space so as to truly appreciate an art form that sprang to life during the twentieth century - the modern film.

Questions 1-5

Choose the correct letter, A, B, C or D

Write the correct letter in boxes 1-5 on your answer sheet.

1. In the first paragraph, the writer makes a point that

- A the director should plan the sound track at an early stage in filming.
- B it would be wrong to overlook the contribution of sound to the artistry of films.
- C the music industry can have a beneficial influence on sound in film.
- D it is important for those working on the sound in a film to have sole responsibility for it.

2. One reason that the writer refers to Humphrey Bogart is to exemplify

- A the importance of the actor and the character appearing to have similar personalities.
- B the audience's wish that actors are visually appropriate for their roles.
- C the value of the actor having had similar feelings to the character.
- D the audience's preference for dialogue to be as authentic as possible.

3. In the third paragraph, the writer suggests that

- A audiences are likely to be critical of film dialogue that does not reflect their own experience.
- B film dialogue that appears to be dull may have a specific purpose.
- C filmmakers vary considerably in the skill with which they handle dialogue.
- D the most successful films are those with dialogue of a high quality.

4. What does the writer suggest about Bringing Up

- A The plot suffers from the filmmaker's wish to focus on humorous dialogue.
- B The dialogue helps to make it one of the best comedy films ever produced.
- C There is a mismatch between the speed of the dialogue and the speed of actions.
- D The nature of the dialogue emphasises key elements of the film.

5. The writer refers to the 'click' of a door to make the point that realistic sounds

- A are often used to give the audience a false impression of events in the film.
- B may be interpreted in different ways by different members of the audience.
- C may be modified in order to manipulate the audience's response to the film.
- D tend to be more significant in films presenting realistic situations.

Source: Cambridge Book 11

Practice 4

The psychology of innovation

Why are so few companies truly innovative?

Innovation is key to business survival, and companies put substantial resources into inspiring employees to develop new ideas. There are, nevertheless, people working in luxurious, state-of-the-art centres designed to stimulate innovation who find that their environment doesn't make them feel at all creative. And there are those who don't have a budget, or much space, but who innovate successfully.

For Robert B. Cialdini, Professor of Psychology at Arizona State University, one reason that companies don't succeed as often as they should is that innovation starts with recruitment. Research shows that the fit between an employee's values and a company's values makes a difference to what contribution they make and whether, two years after they join, they're still at the company. Studies at Harvard Business School show that, although some individuals may be more creative than others, almost every individual can be creative in the right circumstances.

One of the most famous photographs in the story of rock'n'roll emphasises Cialdini's views. The 1956 picture of singers Elvis Presley, Carl Perkins, Johnny Cash and Jerry Lee Lewis jamming at a piano in Sun Studios in Memphis tells a hidden story. Sun's 'million-dollar quartet' could have been a quintet. Missing from the picture is Roy Orbison, a greater natural singer than Lewis, Perkins or Cash. Sam Phillips, who owned Sun, wanted to revolutionise popular music with songs that fused black and white music, and country and blues. Presley, Cash, Perkins and Lewis instinctively understood Phillips's ambition and believed in it. Orbison wasn't inspired by the goal, and only ever achieved one hit with the Sun label.

The value fit matters, says Cialdini, because innovation is, in part, a process of change, and under that pressure we, as a species, behave differently, 'When things change, we are hard-wired to play it safe.' Managers should therefore adopt an approach that appears counterintuitive - they should explain what stands to be lost if the company fails to seize a particular opportunity. Studies show that we invariably take more gambles when threatened with a loss than when offered a reward.

Managing innovation is a delicate art. It's easy for a company to be pulled in conflicting directions as the marketing, product development, and finance departments each get different feedback from different sets of people. And without a system which ensures collaborative exchanges within the company, it's also easy for small pockets of innovation to disappear. Innovation is a contact sport. You can't brief people just by saying, 'We're going in this direction and I'm going to take you with me.'

Cialdini believes that this 'follow-the-leader syndrome' is dangerous, not least because it encourages bosses to do it alone. 'It's been scientifically proven that three people will be better than one at solving problems, even if that one person is the smartest person in the field.' To prove his point, Cialdini cites an interview with molecular biologist James Watson. Watson, together with Francis Crick, discovered the structure of DNA, the genetic information carrier of all living organisms. 'When asked how they had cracked the code ahead of an array of highly accomplished rival investigators, he said something that stunned me. He said "he and Crick had succeeded because they were aware that they weren't the most intelligent of the scientists pursuing the answer."' The smartest scientist was called Rosalind Franklin who, Watson said, "was so intelligent she rarely sought advice".'

Teamwork taps into one of the basic drivers of human behaviour. 'The principle of social proof is so pervasive that we don't even recognise it,' says Cialdini. 'If your project is being resisted, for example, by a group of veteran employees, ask another old-timer to speak up for it.' Cialdini is not alone in advocating this strategy. Research shows that peer power, used horizontally not vertically, is much more powerful than any boss's speech.

Writing, visualising and prototyping can stimulate the flow of new ideas. Cialdini cites scores of research papers and historical events that prove that even something as simple as writing deepens every individual's engagement in the project. It is, he says, the reason why all those competitions on breakfast cereal packets encouraged us to write in saying, in no more than 10 words: 'I like Kellogg's Corn Flakes because...'. The very act of writing makes us more likely to believe it.

Authority doesn't have to inhibit innovation but it often does. The wrong kind of leadership will lead to what Cialdini calls "captain it is, the regrettable tendency of team members to opt out of team responsibilities that are properly theirs." He calls it captain it is because, he says, "crew members of multi-pilot aircraft exhibit a sometimes deadly passivity when the flight captain makes a clearly wrong-headed decision". This behaviour is not, he says, unique to air travel, but can happen in any workplace where the leader is overbearing.

At the other end of the scale is the 1980s Memphis design collective, a group of young designers for whom "the only rule was that there was no rule". This environment encouraged a free interchange of ideas, which led to more creativity with form, function, colour and materials that revolutionised attitudes to furniture design.

Many theorists believe the ideal boss should lead from behind, taking pride in collective accomplishment and giving credit where it is due. Cialdini says "Leaders should encourage everyone to contribute and simultaneously assure all concerned that every recommendation is important to making the right decision and will be given full attention." The frustrating thing about innovation is that there are many approaches, but no magic formula. However, a manager who wants to create a truly innovative culture can make their job a lot easier by recognising these psychological realities.

Questions 1-4

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes 1-4 on your answer sheet.

1. The example of the 'million-dollar quartet' underlines the writer's point about

- A recognising talent.
- B working as a team.
- C having a shared objective.
- D being an effective leader.

2. James Watson suggests that he and Francis Crick won the race to discover the DNA code because they

- A were conscious of their own limitations.
- B brought complementary skills to their partnership.
- C were determined to outperform their brighter rivals.
- D encouraged each other to realise their joint ambition.

3. The writer mentions competitions on breakfast cereal packets as an example of how to

- A inspire creative thinking.
- B generate concise writing.
- C promote loyalty to a group.
- D strengthen commitment to an idea.

4. In the last paragraph, the writer suggests that it is important for employees to

- A be aware of their company's goals.
- B feel that their contributions are valued.
- C have respect for their co-workers' achievements.
- D understand why certain management decisions are made.

Source: Cambridge Book 10

Practice 5

Museums of fine art and their public

The fact that people go to the Louvre museum in Paris to see the original painting of Mona Lisa when they can see a reproduction anywhere leads us to question some assumptions about the role of museums of fine art in today's world.

One of the most famous works of art in the world is Leonardo da Vinci's Mona Lisa. Nearly everyone who goes to see the original will already be familiar with it from reproductions, but they accept that fine art is more rewardingly viewed in its original form.

However, if Mona Lisa was a famous novel, few people would bother to go to a museum to read the writer's actual manuscript rather than a printed reproduction. This might be explained by the fact that the novel has evolved precisely because of technological developments that made it possible to print out huge numbers of texts, whereas oil paintings have always been

produced as unique objects. In addition, it could be argued that the practice of interpreting or 'reading' each medium follows different conventions. With novels, the reader attends mainly to the meaning of words rather than the way they are printed on the page, whereas the 'reader' of a painting must attend just as closely to the material form of marks and shapes in the picture as to any ideas they may signify.

Yet it has always been possible to make very accurate facsimiles of pretty well any fine art work. The seven surviving versions of Mona Lisa bear witness to the fact that in the 16th century, artists seemed perfectly content to assign the reproduction of their creations to their workshop apprentices as regular 'bread and butter' work. And today the task of reproducing pictures is incomparably more simple and reliable, with reprographic techniques that allow the production of high-quality prints made exactly to the original scale, with faithful colour values, and even with duplication of the surface relief of the painting.

But despite an implicit recognition that the spread of good reproductions can be culturally valuable, museums continue to promote the special status of original work.

Unfortunately, this seems to place severe limitations on the kind of experience offered to visitors.

One limitation is related to the way the museum presents its exhibits. As repositories of unique historical objects, art museums are often called 'treasure houses'. We are reminded of this even before we view a collection by the presence of security guards, attendants, ropes and display cases to keep us away from the exhibits. In many cases, the architectural style of the building further reinforces that notion. In addition, a major collection like that of London's National Gallery is housed in numerous rooms, each with dozens of works, any one of which is likely to be worth more than all the average visitor possesses. In a society that judges the personal status of the individual so much by their material worth, it is therefore difficult not to be impressed by one's own relative 'worthlessness' in such an environment.

Furthermore, consideration of the 'value' of the original work in its treasure house setting impresses upon the viewer that, since these works were

originally produced, they have been assigned a huge monetary value by some person or institution more powerful than themselves. Evidently, nothing the viewer thinks about the work is going to alter that value, and so today's viewer is deterred from trying to extend that spontaneous, immediate, self-reliant kind of reading which would originally have met the work.

The visitor may then be struck by the strangeness of seeing such diverse paintings, drawings and sculptures brought together in an environment for which they were not originally created. This 'displacement effect' is further heightened by the sheer volume of exhibits. In the case of a major collection, there are probably more works on display than we could realistically view in weeks or even months.

This is particularly distressing because time seems to be a vital factor in the appreciation of all art forms. A fundamental difference between paintings and other art forms is that there is no prescribed time over which a painting is viewed. By contrast, the audience encourages an opera or a play over a specific time, which is the duration of the performance. Similarly novels and poems are read in a prescribed temporal sequence, whereas a picture has no clear place at which to start viewing, or at which to finish. Thus artworks themselves encourage us to view them superficially, without appreciating the richness of detail and labour that is involved.

Consequently, the dominant critical approach becomes that of the art historian, a specialised academic approach devoted to 'discovering the meaning' of art within the cultural context of its time. This is in perfect harmony with the museum's function, since the approach is dedicated to seeking out and conserving 'authentic', original, readings of the exhibits. Again, this seems to put paid to that spontaneous, participatory criticism which can be found in abundance in criticism of classic works of literature, but is absent from most art history.

The displays of art museums serve as a warning of what critical practices can emerge when spontaneous criticism is suppressed. The museum public, like any other audience, experience art more rewardingly when given the confidence to express their views. If appropriate works of fine art could be rendered permanently accessible to the public by means of high-fidelity

reproductions, as literature and music already are, the public may feel somewhat less in awe of them. Unfortunately, that may be too much to ask from those who seek to maintain and control the art establishment.

Questions 6-9

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes 6-9 on your answer sheet

6. The writer mentions London's National Gallery to illustrate

- A the undesirable cost to a nation of maintaining a huge collection of art.
- B the conflict that may arise in society between financial and artistic values.
- C the negative effect a museum can have on visitors' opinions of themselves.
- D the need to put individual well-being above large-scale artistic schemes.

7. The writer says that today, viewers may be unwilling to criticise a work because

- A they lack the knowledge needed to support an opinion.
- B they fear it may have financial implications.
- C they have no real concept of the work's value.
- D they feel their personal reaction is of no significance.

8. According to the writer, the 'displacement effect' on the visitor is caused by

- A the variety of works on display and the way they are arranged.
- B the impossibility of viewing particular works of art over a long period.
- C the similar nature of the paintings and the lack of great works.
- D the inappropriate nature of the individual works selected for exhibition.

9. The writer says that unlike other forms of art, a painting does not

- A involve direct contact with an audience.
- B require a specific location for a performance.
- C need the involvement of other professionals.
- D have a specific beginning or end.

Source: Cambridge Book 10

Practice 6

Ancient voyagers who settled the far-flung islands of the Pacific Ocean

(1)

An important archaeological discovery on the island of Efate in the Pacific archipelago of Vanuatu has revealed traces of an ancient seafaring people, the distant ancestors of today's Polynesians. The site came to light only by chance. An agricultural worker, digging in the grounds of a derelict plantation, scraped open a grave – the first of dozens in a burial ground some 3,000 years old. It is the oldest cemetery ever found in the Pacific islands, and it harbors the remains of an ancient people archaeologists call the Lapita.

(2)

They were daring blue-water adventurers who used basic canoes to rove across the ocean. But they were not just explorers. They were also pioneers who carried with them everything they would need to build new lives – their livestock, taro seedlings and stone tools. Within the span of several centuries, the Lapita stretched the boundaries of their world from the jungle-clad volcanoes of Papua New Guinea to the loneliest coral outliers of Tonga.

(3)

The Lapita left precious few clues about themselves, but Efate expands the volume of data available to researchers dramatically. The remains of 62 individuals have been uncovered so far, and archaeologists were also thrilled to find six complete Lapita pots. Other items included a Lapita burial urn with modeled birds arranged on the rim as though peering down at the human remains sealed inside. 'It's an important discovery,' says Matthew Spriggs, professor of archaeology at the Australian National University and head of the international team digging up the site, 'for it conclusively identifies the remains as Lapita.'

(4)

DNA teased from these human remains may help answer one of the most puzzling questions in Pacific anthropology: did all Pacific islanders spring from

one source or many? Was there only one outward migration from a single point in Asia, or several from different points? 'This represents the best opportunity we've had yet,' says Spriggs, 'to find out who the Lapita actually were, where they came from, and who their closest descendants are today.'

(5)

There is one stubborn question for which archaeology has yet to provide any answers: how did the Lapita accomplish the ancient equivalent of a moon landing, many times over? No-one has found one of their canoes or any rigging, which could reveal how the canoes were sailed. Nor do the oral histories and traditions of later Polynesians offer any insights, for they turn into myths long before they reach as far back in time as the Lapita.

(6)

'All we can say for certain is that the Lapita had canoes that were capable of ocean voyages, and they had the ability to sail them,' says Geoff Irwin, a professor of archaeology at the University of Auckland. Those sailing skills, he says, were developed and passed down over thousands of years by earlier mariners who worked their way through the archipelagoes of the western Pacific, making short crossings to nearby islands. The real adventure didn't begin, however, until their Lapita descendants sailed out of sight of land, with empty horizons on every side. This must have been as difficult for them as landing on the moon is for us today. Certainly it distinguished them from their ancestors, but what gave them the courage to launch out on such risky voyages?

(7)

The Lapita's thrust into the Pacific was eastward, against the prevailing trade winds, Irwin notes. Those nagging headwinds, he argues, may have been the key to their success. 'They could sail out for days into the unknown and assess the area, secure in the knowledge that if they didn't find anything, they could turn about and catch a swift ride back on the trade winds. This is what would have made the whole thing work.' Once out there, skilled seafarers would have detected abundant leads to follow to land: seabirds, coconuts and twigs carried out to sea by the tides, and the afternoon pile-up of clouds on the horizon which often indicates an island in the distance.

(8)

For returning explorers, successful or not, the geography of their own archipelagoes would have provided a safety net. Without this to go by, overshooting their home ports, getting lost and sailing off into eternity would have been all too easy. Vanuatu, for example, stretches more than 500 miles in a northwest-southeast trend, its scores of intervisible islands forming a backstop for mariners riding the trade winds home.

(9)

All this presupposes one essential detail, says Atholl Anderson, professor of prehistory at the Australian National University: the Lapita had mastered the advanced art of sailing against the wind. 'And there's no proof they could do any such thing,' Anderson says. 'There has been this assumption they made, and people have built canoes to recreate those early voyages based on that assumption. But nobody has any idea what their canoes looked like or how they were rigged.'

(10)

Rather than give all the credit to human skill, Anderson invokes the winds of chance. El Nino, the same climate disruption that affects the Pacific today, may have helped scatter the Lapita, Anderson suggests. He points out that climate data obtained from slow-growing corals around the Pacific indicate a series of unusually frequent El Ninos around the time of the Lapita expansion. By reversing the regular east-to-west flow of the trade winds for weeks at a time, these super El Ninos might have taken the Lapita on long unplanned voyages.

(11)

However they did it, the Lapita spread themselves a third of the way across the Pacific, then called it quits for reasons known only to them. Ahead lay the vast emptiness of the central Pacific and perhaps they were too thinly stretched to venture farther. They probably never numbered more than a few thousand in total, and in their rapid migration eastward they encountered hundreds of islands – more than 300 in Fiji alone.

Questions 6-9

Choose the correct letter A, B, C or D.

Write the correct letter in boxes 6-9 on your answer sheet.

6. According to the writer, there are difficulties explaining how the Lapita accomplished their journeys because

- A the canoes that have been discovered offer relatively few clues.
- B archaeologists have shown limited interest in this area of research.
- C little information relating to this period can be relied upon for accuracy.
- D technological advances have altered the way such achievements are viewed.

7. According to the sixth paragraph, what was extraordinary about the Lapita?

- A They sailed beyond the point where land was visible.
- B Their cultural heritage discouraged the expression of fear.
- C They were able to build canoes that withstood ocean voyages.
- D Their navigational skills were passed on from one generation to the next.

8. What does 'This' refer to in the seventh paragraph?

- A the Lapita's seafaring talent
- B the Lapita's ability to detect signs of land
- C the Lapita's extensive knowledge of the region
- D the Lapita's belief they would be able to return home

9. According to the eighth paragraph, how was the geography of the region significant?

- A It played an important role in Lapita culture.
- B It meant there were relatively few storms at sea.
- C It provided a navigational aid for the Lapita.
- D It made a large number of islands habitable.

Source: Cambridge Book 10

Practice 7

When evolution runs backwards

Evolution isn't supposed to run backwards - yet an increasing number of examples show that it does and that it can sometimes represent the future of a species.

The description of any animal as an 'evolutionary throwback' is controversial. For the better part of a century, most biologists have been reluctant to use those words, mindful of a principle of evolution that says 'evolution cannot run backwards. But as more and more examples come to light and modern genetics enters the scene, that principle is having to be rewritten. Not only are evolutionary throwbacks possible, they sometimes play an important role in the forward march of evolution.

The technical term for an evolutionary throwback is an 'atavism', from the Latin *atavus*, meaning forefather. The word has ugly connotations thanks largely to Cesare Lombroso, a 19th-century Italian medic who argued that criminals were born not made and could be identified by certain physical features that were throwbacks to a primitive, subhuman state.

While Lombroso was measuring criminals, a Belgian palaeontologist called Louis Dollo was studying fossil records and coming to the opposite conclusion. In 1890 he proposed that evolution was irreversible: that an organism is unable to return, even partially, to a previous stage already realised in the ranks of its ancestors. Early 20th-century biologists came to a similar conclusion, though they qualified it in terms of probability, stating that there is no reason why evolution cannot run backwards - it is just very unlikely. And so the idea of irreversibility in evolution stuck and came to be known as 'Dollo's law'.

If Dollo's law is right, atavisms should occur only very rarely, if at all. Yet almost since the idea took root, exceptions have been cropping up. In 1919, for example, a humpback whale with a pair of leglike appendages over a metre long, complete with a full set of limb bones, was caught off Vancouver Island in Canada. Explorer Roy Chapman Andrews argued at the time that the whale must be a throwback to a land-living ancestor. 'I can see no other explanation, he wrote in 1921.'

Since then, so many other examples have been discovered that it no longer makes sense to say that evolution is as good as irreversible. And this poses a puzzle: how can characteristics that disappeared millions of years ago suddenly reappear?

In 1994, Rudolf Raff and colleagues at Indiana University in the USA decided to use genetics to put a number on the probability of evolution going into reverse. They reasoned that while some evolutionary changes involve the loss of genes and are therefore irreversible, others may be the result of genes being switched off. If these silent genes are somehow switched back on, they argued, long lost traits could reappear.

Raff's team went on to calculate the likelihood of it happening. Silent genes accumulate random mutations, they reasoned, eventually rendering them useless. So how long can a gene survive in a species if it is no longer used? The team calculated that there is a good chance of silent genes surviving for up to 6 million years in at least a few individuals in a population, and that some might survive as long as 10 million years. In other words, throwbacks are possible, but only to the relatively recent evolutionary past.

As a possible example, the team pointed to the mole salamanders of Mexico and California. Like most amphibians these begin life in a juvenile 'tadpole' state, then metamorphose into the adult form – except for one species, the axolotl, which famously lives its entire life as a juvenile. The simplest explanation for this is that the axolotl lineage alone lost the ability to metamorphose, while others retained it. From a detailed analysis of the salamanders' family tree, however, it is clear that the other lineages evolved from an ancestor that itself had lost the ability to metamorphose. In other words, metamorphosis in mole salamanders is an atavism. The salamander example fits with Raff's 10million-year time frame.

More recently, however, examples have been reported that break the time limit, suggesting that silent genes may not be the whole story. In a paper published last year, biologist Gunter Wagner of Yale University reported some work on the evolutionary history of a group of South American lizards called *Bachia*. Many of these have minuscule limbs; some look more like snakes than lizards and a few have completely lost the toes on their hind limbs. Other species, however, sport up to four toes on their hind legs. The simplest explanation is that the toed

lineages never lost their toes, but Wagner begs to differ. According to his analysis of the *Bachia* family tree, the toed species re-evolved toes from toeless ancestors and, what is more, digit loss and gain has occurred on more than one occasion over tens of millions of years.

So what's going on? One possibility is that these traits are lost and then simply reappear, in much the same way that similar structures can independently arise in unrelated species, such as the dorsal fins of sharks and killer whales. Another more intriguing possibility is that the genetic information needed to make toes somehow survived for tens or perhaps hundreds of millions of years in the lizards and was reactivated. These atavistic traits provided an advantage and spread through the population, effectively reversing evolution.

But if silent genes degrade within 6 to million years, how can long-lost traits be reactivated over longer timescales? The answer may lie in the womb. Early embryos of many species develop ancestral features. Snake embryos, for example, sprout hind limb buds. Later in development, these features disappear, thanks to developmental programs that say 'lose the leg'. If for any reason this does not happen, the ancestral feature may not disappear, leading to an atavism.

Questions 1-5

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes 1-5 on your answer sheet.

1. When discussing the theory developed by Louis Dollo, the writer says that

- A it was immediately referred to as Dollo's law.
- B it supported the possibility of evolutionary throwbacks.
- C it was modified by biologists in the early twentieth century.
- D it was based on many years of research.

2. The humpback whale caught off Vancouver Island is mentioned because of

- A the exceptional size of its body.
- B the way it exemplifies Dollo's law.
- C the amount of local controversy it caused.
- D the reason given for its unusual features.

3. What is said about 'silent genes'?

- A Their numbers vary according to species.
- B Raff disagreed with the use of the term.
- C They could lead to the re-emergence of certain characteristics.
- D They can have an unlimited life span.

4. The writer mentions the mole salamander because

- A it exemplifies what happens in the development of most amphibians.
- B it suggests that Raffe's theory is correct.
- C it has lost and regained more than one ability.
- D its ancestors have become the subject of extensive research.

5. Which of the following does Wagner claim?

- A Members of the Bachia lizard family have lost and regained certain features several times.
- B Evidence shows that the evolution of the Bachia lizard is due to the environment.
- C His research into South American lizards supports Raffe's assertions.
- D His findings will apply to other species of South American lizards

Source: Cambridge Book 10

Practice 8

A neuroscientist reveals how to think differently

In the last decade a revolution has occurred in the way that scientists think about the brain.

We now know that the decisions humans make can be traced to the firing patterns of neurons in specific parts of the brain. These discoveries have led to the field known as neuroeconomics, which studies the brain's secrets to success in an economic environment that demands innovation and being able to do things differently from competitors. A brain that can do this is an iconoclastic

one. Briefly, an iconoclast is a person who does something that others say can't be done.

This definition implies that iconoclasts are different from other people, but more precisely, it is their brains that are different in three distinct ways: perception, fear response, and social intelligence. Each of these three functions utilizes a different circuit in the brain. Naysayers might suggest that the brain is irrelevant, that thinking in an original, even revolutionary way is more a matter of personality than brain function. But the field of neuroeconomics was born out of the realization that the physical workings of the brain place limitations on the way we make decisions. By understanding these constraints, we begin to understand why some people march to a different drumbeat.

The first thing to realize is that the brain suffers from limited resources. It has a fixed energy budget, about the same as a 40 watt light bulb, so it has evolved to work as efficiently as possible. This is where most people are impeded from being an iconoclast. For example, when confronted with information streaming from the eyes, the brain will interpret this information in the quickest way possible. Thus it will draw on both past experience and any other source of information, such as what other people say, to make sense of what it is seeing. This happens all the time. The brain takes shortcuts that work so well we are hardly ever aware of them.

We think our perceptions of the world are real, but they are only biological and electrical rumblings. Perception is not simply a product of what your eyes or ears transmit to your brain. More than the physical reality of photons or sound waves, perception is a product of the brain.

Perception is central to iconoclasm. Iconoclasts see things differently to other people. Their brains do not fall into efficiency pitfalls as much as the average person's brain. Iconoclasts, either because they were born that way or through learning, have found ways to work around the perceptual shortcuts that plague most people. Perception is not something that is hardwired into the brain. It is a learned process, which is both a curse and an opportunity for change. The brain faces the fundamental problem of interpreting physical stimuli from the senses. Everything the brain sees, hears, or touches has multiple interpretations. The one that is ultimately chosen is simply the brain's best theory. In technical terms, these conjectures have their basis in the statistical likelihood of one

interpretation over another and are heavily influenced by past experience and, importantly for potential iconoclasts, what other people say.

The best way to see things differently to other people is to bombard the brain with things it has never encountered before. Novelty releases the perceptual process from the chains of past experience and forces the brain to make new judgments. Successful iconoclasts have an extraordinary willingness to be exposed to what is fresh and different. Observation of iconoclasts shows that they embrace novelty while most people avoid things that are different.

The problem with novelty, however, is that it tends to trigger the brain's fear system. Fear is a major impediment to thinking like an iconoclast and stops the average person in his tracks. There are many types of fear, but the two that inhibit iconoclastic thinking and people generally find difficult to deal with are fear of uncertainty and fear of public ridicule. These may seem like trivial phobias. But fear of public speaking, which everyone must do from time to time, afflicts one-third of the population. This makes it too common to be considered a mental disorder. It is simply a common variant of human nature, one which iconoclasts do not let inhibit their reactions.

Finally, to be successful iconoclasts, individuals must sell their ideas to other people. This is where social intelligence comes in. Social intelligence is the ability to understand and manage people in a business setting. In the last decade, there has been an explosion of knowledge about the social brain and how the brain works when groups coordinate decision making. Neuroscience has revealed which brain circuits are responsible for functions like understanding what other people think, empathy, fairness, and social identity. These brain regions play key roles in whether people convince others of their ideas. Perception is important in social cognition too. The perception of someone's enthusiasm, or reputation, can make or break a deal. Understanding how perception becomes intertwined with social decision making shows why successful iconoclasts are so rare.

Iconoclasts create new opportunities in every area from artistic expression to technology to business. They supply creativity and innovation not easily accomplished by committees. Rules aren't important to them. Iconoclasts face alienation and failure, but can also be a major asset to any organization. It is crucial for success in any field to understand how the iconoclastic mind works.

Questions 1-5

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes 1-5 on your answer sheet.

1. Neuroeconomics is a field of study which seeks to

- A cause a change in how scientists understand brain chemistry.
- B understand how good decisions are made in the brain.
- C understand how the brain is linked to achievement in competitive fields.
- D trace the specific firing patterns of neurons in different areas of the brain.

2. According to the writer, iconoclasts are distinctive because

- A they create unusual brain circuits.
- B their brains function differently.
- C their personalities are distinctive.
- D they make decisions easily.

3. According to the writer, the brain works efficiently because

- A it uses the eyes quickly.
- B it interprets data logically.
- C it generates its own energy.
- D it relies on previous events.

4. The writer says that perception is

- A a combination of photons and sound waves.
- B a reliable product of what your senses transmit.
- C a result of brain processes.
- D a process we are usually conscious of.

5. According to the writer, an iconoclastic thinker

- A centralises perceptual thinking in one part of the brain.
- B avoids cognitive traps.
- C has a brain that is hardwired for learning.
- D has more opportunities than the average person.

Source: Cambridge Book 9

Practice 9

Educating Psyche

Educating Psyche by Bernie Neville is a book which looks at radical new approaches to learning, describing the effects of emotion, imagination and the unconscious on learning. One theory discussed in the book is that proposed by George Lozanov, which focuses on the power of suggestion.

Lozanov's instructional technique is based on the evidence that the connections made in the brain through unconscious processing (which he calls non-specific mental reactivity) are more durable than those made through conscious processing. Besides the laboratory evidence for this, we know from our experience that we often remember what we have perceived peripherally, long after we have forgotten what we set out to learn. If we think of a book we studied months or years ago, we will find it easier to recall peripheral details - the colour, the binding, the typeface, the table at the library where we sat while studying it - than the content on which we were concentrating. If we think of a lecture we listened to with great concentration, we will recall the lecturer's appearance and mannerisms, our place in the auditorium, the failure of the air-conditioning, much more easily than the ideas we went to learn. Even if these peripheral details are a bit elusive, they come back readily in hypnosis or when we relive the event imaginatively, as in psychodrama. The details of the content of the lecture, on the other hand, seem to have gone forever.

This phenomenon can be partly attributed to the common counterproductive approach to study (making extreme efforts to memorise, tensing muscles, inducing fatigue), but it also simply reflects the way the brain functions. Lozanov therefore made indirect instruction (suggestion) central to his teaching system. In Suggestopedia, as he called his method, consciousness is shifted away from the curriculum to focus on something peripheral. The curriculum then becomes peripheral and is dealt with by the reserve capacity of the brain.

The suggestopedic approach to foreign language learning provides a good illustration. In its most recent variant (1980), it consists of the reading of vocabulary and text while the class is listening to music. The first session is in

two parts. In the first part, the music is classical (Mozart, Beethoven, Brahms) and the teacher reads the text slowly and solemnly, with attention to the dynamics of the music. The students follow the text in their books. This is followed by several minutes of silence. In the second part, they listen to baroque music (Bach, Corelli, Handel) while the teacher reads the text in a normal speaking voice. During this time they have their books closed. During the whole of this session, their attention is passive; they listen to the music but make no attempt to learn the material.

Beforehand, the students have been carefully prepared for the language learning experience. Through meeting with the staff and satisfied students they develop the expectation that learning will be easy and pleasant and that they will successfully learn several hundred words of the foreign language during the class. In a preliminary talk, the teacher introduces them to the material to be covered, but does not 'teach' it. Likewise, the students are instructed not to try to learn it during this introduction.

Some hours after the two-part session, there is a follow-up class at which the students are stimulated to recall the material presented. Once again the approach is indirect. The students do not focus their attention on trying to remember the vocabulary, but focus on using the language to communicate (e.g. through games or improvised dramatisations). Such methods are not unusual in language teaching. What is distinctive in the suggestopedic method is that they are devoted entirely to assisting recall. The 'learning' of the material is assumed to be automatic and effortless, accomplished while listening to music. The teacher's task is to assist the students to apply what they have learned para consciously, and in doing so to make it easily accessible to consciousness. Another difference from conventional teaching is the evidence that students can regularly learn 1000 new words of a foreign language during a suggestopedic session, as well as grammar and idiom.

Lozanov experimented with teaching by direct suggestion during sleep, hypnosis and trance states, but found such procedures unnecessary. Hypnosis, yoga, Silva mind-control, religious ceremonies and faith healing are all associated with successful suggestion, but none of their techniques seem to be essential to it. Such rituals may be seen as placebos. Lozanov acknowledges that the ritual

surrounding suggestion in his own system is also a placebo, but maintains that without such a placebo people are unable or afraid to tap the reserve capacity of their brains. Like any placebo, it must be dispensed with authority to be effective. Just as a doctor calls on the full power of autocratic suggestion by insisting that the patient take precisely this white capsule precisely three times a day before meals, Lozanov is categoric in insisting that the suggestopedic session be conducted exactly in the manner designated, by trained and accredited suggestopedic teachers.

While suggestopedia has gained some notoriety through success in the teaching of modern languages, few teachers are able to emulate the spectacular results of Lozanov and his associates. We can, perhaps, attribute mediocre results to an inadequate placebo effect. The students have not developed the appropriate mindset. They are often not motivated to learn through this method. They do not have enough 'faith'. They do not see it as 'real teaching', especially as it does not seem to involve the 'work' they have learned to believe is essential to learning.

Questions 1-4

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes 1-4 on your answer sheet.

1. The book *Educating Psyche* is mainly concerned with

- A the power of suggestion in learning.
- B a particular technique for learning based on emotions.
- C the effects of emotion on the imagination and the unconscious.
- D ways of learning which are not traditional.

2. Lozanov's theory claims that, when we try to remember things,

- A unimportant details are the easiest to recall.
- B concentrating hard produces the best results.
- C the most significant facts are most easily recalled.
- D peripheral vision is not important.

3. In this passage, the author uses the examples of a book and a lecture to illustrate that

- A both of these are important for developing concentration.
- B his theory about methods of learning is valid.
- C reading is a better technique for learning than listening.
- D we can remember things more easily under hypnosis.

4. Lozanov claims that teachers should train students to

- A memorise details of the curriculum.
- B develop their own sets of indirect instructions.
- C think about something other than the curriculum content.
- D avoid overloading the capacity of the brain.

Source: Cambridge Book 7

Practice 10

Why pagodas don't fall down

In a land swept by typhoons and shaken by earthquakes, how have Japan's tallest and seemingly flimsiest old buildings - 500 or so wooden pagodas - remained standing for centuries? Records show that only two have collapsed during the past 1400 years. Those that have disappeared were destroyed by fire as a result of lightning or civil war. The disastrous Hanshin earthquake in 1995 killed 6,400 people, toppled elevated highways, flattened office blocks and devastated the port area of Kobe. Yet it left the magnificent five-storey pagoda at the Toji temple in nearby Kyoto unscathed, though it levelled a number of buildings in the neighbourhood.

Japanese scholars have been mystified for ages about why these tall, slender buildings are so stable. It was only thirty years ago that the building industry felt confident enough to erect office blocks of steel and reinforced concrete that had more than a dozen floors. With its special shock absorbers to dampen the effect of sudden sideways movements from an earthquake, the thirty-six-storey Kasumigaseki building in central Tokyo - Japan's first skyscraper - was considered a masterpiece of modern engineering when it was built in 1968.

Yet in 826, with only pegs and wedges to keep his wooden structure upright, the master builder Kobodaishi had no hesitation in sending his majestic Toji pagoda soaring fifty-five metres into the sky - nearly half as high as the Kasumigaseki skyscraper built some eleven centuries later. Clearly, Japanese carpenters of the day knew a few tricks about allowing a building to sway and settle itself rather than fight nature's forces. But what sort of tricks?

The multi-storey pagoda came to Japan from China in the sixth century. As in China, they were first introduced with Buddhism and were attached to important temples. The Chinese built their pagodas in brick or stone, with inner staircases, and used them in later centuries mainly as watchtowers. When the pagoda reached Japan, however, its architecture was freely adapted to local conditions - they were built less high, typically five rather than nine storeys, made mainly of wood and the staircase was dispensed with because the Japanese pagoda did not have any practical use but became more of an art object. Because of the typhoons that batter Japan in the summer, Japanese builders learned to extend the eaves of buildings further beyond the walls. This prevents rainwater gushing down the walls. Pagodas in China and Korea have nothing like the overhang that is found on pagodas in Japan.

The roof of a Japanese temple building can be made to overhang the sides of the structure by fifty per cent or more of the building's overall width. For the same reason, the builders of Japanese pagodas seem to have further increased their weight by choosing to cover these extended eaves not with the porcelain tiles of many Chinese pagodas but with much heavier earthenware tiles.

But this does not totally explain the great resilience of Japanese pagodas. Is the answer that, like a tall pine tree, the Japanese pagoda - with its massive trunk-like central pillar known as shinbashira - simply flexes and sways during a typhoon or earthquake? For centuries, many thought so. But the answer is not so simple because the startling thing is that the shinbashira actually carries no load at all. In fact, in some pagoda designs, it does not even rest on the ground, but is suspended from the top of the pagoda - hanging loosely down through the middle of the building. The weight of the building is supported entirely by twelve outer and four inner columns.

And what is the role of the shinbashira, the central pillar? The best way to

understand the shinbashira's role is to watch a video made by Shuzo Ishida, a structural engineer at Kyoto Institute of Technology. Mr Ishida, known to his students as 'Professor Pagoda' because of his passion to understand the pagoda, has built a series of models and tested them on a 'shake-table' in his laboratory. In short, the shinbashira was acting like an enormous stationary pendulum. The ancient craftsmen, apparently without the assistance of very advanced mathematics, seemed to grasp the principles that were, more than a thousand years later, applied in the construction of Japan's first skyscraper. What those early craftsmen had found by trial and error was that under pressure a pagoda's loose stack of floors could be made to slither to and fro independent of one another. Viewed from the side, the pagoda seemed to be doing a snake dance - with each consecutive floor moving in the opposite direction to its neighbours above and below. The shinbashira, running up through a hole in the centre of the building, constrained individual storeys from moving too far because, after moving a certain distance, they banged into it, transmitting energy away along the column.

Another strange feature of the Japanese pagoda is that, because the building tapers, with each successive floor plan being smaller than the one below, none of the vertical pillars that carry the weight of the building is connected to its corresponding pillar above. In other words, a five-storey pagoda contains not even one pillar that travels right up through the building to carry the structural loads from the top to the bottom. More surprising is the fact that the individual storeys of a Japanese pagoda, unlike their counterparts elsewhere, are not actually connected to each other. They are simply stacked one on top of another like a pile of hats. Interestingly, such a design would not be permitted under current Japanese building regulations.

And the extra-wide eaves? Think of them as a tightrope walker's balancing pole. The bigger the mass at each end of the pole, the easier it is for the tightrope walker to maintain his or her balance. The same holds true for a pagoda. 'With the eaves extending out on all sides like balancing poles,' says Mr Ishida, 'the building responds to even the most powerful jolt of an earthquake with a graceful swaying, never an abrupt shaking.' Here again, Japanese master builders of a thousand years ago anticipated concepts of modern structural engineering.

Questions 11-13

Choose the correct letter, A, B, C or D.

Write the correct letter in boxes 11-13 on your answer sheet.

11. In a Japanese pagoda, the shinbashira

- A bears the full weight of the building.
- B bends under pressure like a tree.
- C connects the floors with the foundations.
- D stops the floors moving too far.

12. Shuzo Ishida performs experiments in order to

- A improve skyscraper design.
- B be able to build new pagodas.
- C learn about the dynamics of pagodas.
- D understand ancient mathematics.

13. The storeys of a Japanese pagoda are

- A linked only by wood.
- B fastened only to the central pillar.
- C fitted loosely on top of each other.
- D joined by special weights.

Source: Cambridge Book 7

Flowchart completion

Definition: -

This question type should be answered in the order as occurs in the reading text. Different stages, steps, and arrows will give you an idea of what is next. To identify the stages, read the text carefully.

Strategy

1. Read the instructions carefully and do not exceed the word limit.

2. Now read the questions and underline the key words.
3. Skim and scan the passage to locate the keyword. Then do detailed reading to find the right answer.

Tips:

1. These questions usually are in order of the text.
2. Do not try to make/write complete sentences.
3. These questions are comparatively easier than the rest of the questions.

In-class Content

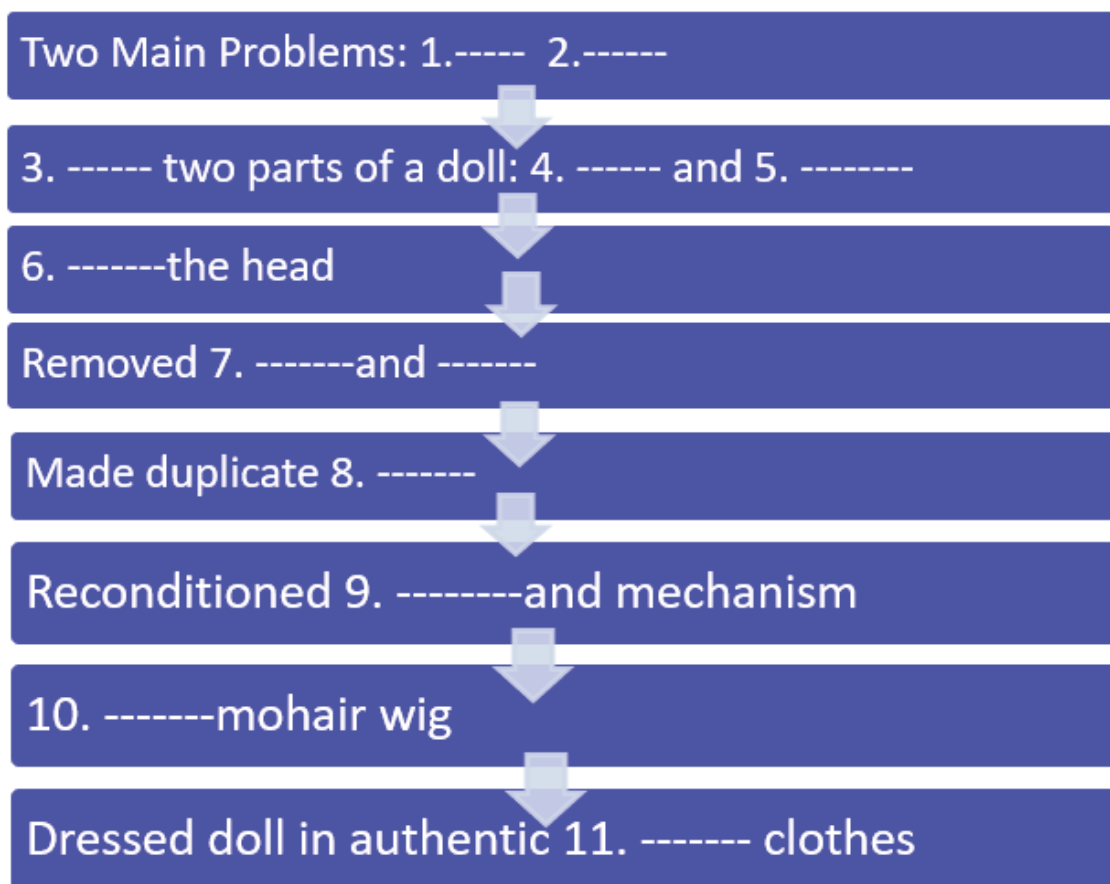
Exercise 1

Complete the chart below.

Choose NO MORE THAN THREE WORDS for each answer

DOLL RESTORATION

This is a good example of how the average doll collector receives a doll. They will find a beautiful antique doll that does not look as beautiful as it should, but with proper restoration she can be as beautiful as the day she was created. Here, there are two main problems, the eye mechanism has lost its original look, and it has a loose head. We removed the mohair wig and removed the eye system. Then, we separated the head from the composition body and chemically cleaned the head, removing old dirt, and wax, but not harming the original artwork. We repaired the missing porcelain teeth by making duplicate porcelain teeth to match, and reinserted them. Then we took the original eye system, and reconditioned it. We then did the waxing of the eye mechanism and reset the eye bar so the eye bar would open and close as it originally did. What a wonderful difference. After this, we chemically cleaned and restyled the original mohair wig. Seamstress took over at this point with our suggestions from the owner on likes and dislikes using original period clothing designs. She now looked, I'm sure, very much as she would have originally looked the day a little child fell in love with her for the first time.



Source: IELTS – The complete guide to general reading, *DOLL RESTORATION*

Practice Exercises

Practice 1

The history of the tortoise

If you go back far enough, everything lived in the sea. At various points in evolutionary history, enterprising individuals within many different animal groups moved out onto the land, sometimes even to the most parched deserts, taking their own private seawater with them in blood and cellular fluids. In addition to the reptiles, birds, mammals and insects which we

their remote ancestors. They don't even come ashore to breed. They do, however, still breathe air, having never developed anything equivalent to the gills of their earlier marine incarnation. Turtles went back to the sea a very long time ago and, like all vertebrate returnees to the water, they breathe air. However, they are, in one respect, less fully given back to the water

see all around us, other groups that have succeeded out of water include scorpions, snails, crustaceans such as woodlice and land crabs, millipedes and centipedes, spiders and various worms. And we mustn't forget the plants, without whose prior invasion of the land none of the other migrations could have happened.

Moving from water to land involved a major redesign of every aspect of life, including breathing and reproduction. Nevertheless, a good number of thoroughgoing land animals later turned around, abandoned their hard-earned terrestrial re-tooling, and returned to the water again. Seals have only gone part way back. They show us what the intermediates might have been like, on the way to extreme cases such as whales and dugongs. Whales (including the small whales we call dolphins) and dugongs, with their close cousins the manatees, ceased to be land creatures altogether and reverted to the full marine habits of 71 species of living turtles and tortoises. They used a kind of triangular graph paper to plot the three measurements against one another. All the land tortoise species formed a tight cluster of points in the upper part of the triangle; all the water turtles cluster in the lower part of the triangular graph. There was no overlap, except when they added some species that spend time both in water and on land. Sure enough, these amphibious species show up on the triangular graph approximately half way between the 'wet cluster' of sea turtles and the 'dry cluster' of land tortoises. The next step was to determine where the fossils fell. The bones of *P. quenstedti* and *P. talampayensis* leave us in no doubt. Their points on the graph are right in the thick of the dry cluster. Both these fossils were dry-land tortoises. They come from the era before our turtles returned to the water.

than whales or dugongs, for turtles still lay their eggs on beaches.

There is evidence that all modern turtles are descended from a terrestrial ancestor which lived before most of the dinosaurs. There are two key fossils called *Proganochelys quenstedti* and *Palaeochersis talampayensis* dating from early dinosaur times, which appear to be close to the ancestry of all modern turtles and tortoises. You might wonder how we can tell whether fossil animals lived on land or in water, especially if only fragments are found. Sometimes it's obvious. Ichthyosaurs were reptilian contemporaries of the dinosaurs, with fins and streamlined bodies. The fossils look like dolphins and they surely lived like dolphins, in the water. With turtles it is a little less obvious. One way to tell is by measuring the bones of their forelimbs.

Walter Joyce and Jacques Gauthier, at Yale University, obtained three measurements in these particular bones not. If you draw out the family tree of all modern turtles and tortoises, nearly all the branches are aquatic. Today's land tortoises constitute a single branch, deeply nested among branches consisting of aquatic turtles. This suggests that modern land tortoises have not stayed on land continuously since the time of *P. quenstedti* and *P. talampayensis*. Rather, their ancestors were among those who went back to the water, and they then re-emerged back onto the land in (relatively) more recent times.

Tortoises therefore represent a remarkable double return. In common with all mammals, reptiles and birds, their remote ancestors were marine fish and before that various more or less worm-like creatures stretching back, still in the sea, to the primeval bacteria. Later ancestors lived on land and stayed there for a very large

You might think, therefore, that modern land tortoises have probably stayed on land ever since those early terrestrial times, as most mammals did after a few of them went back to the sea. But apparently

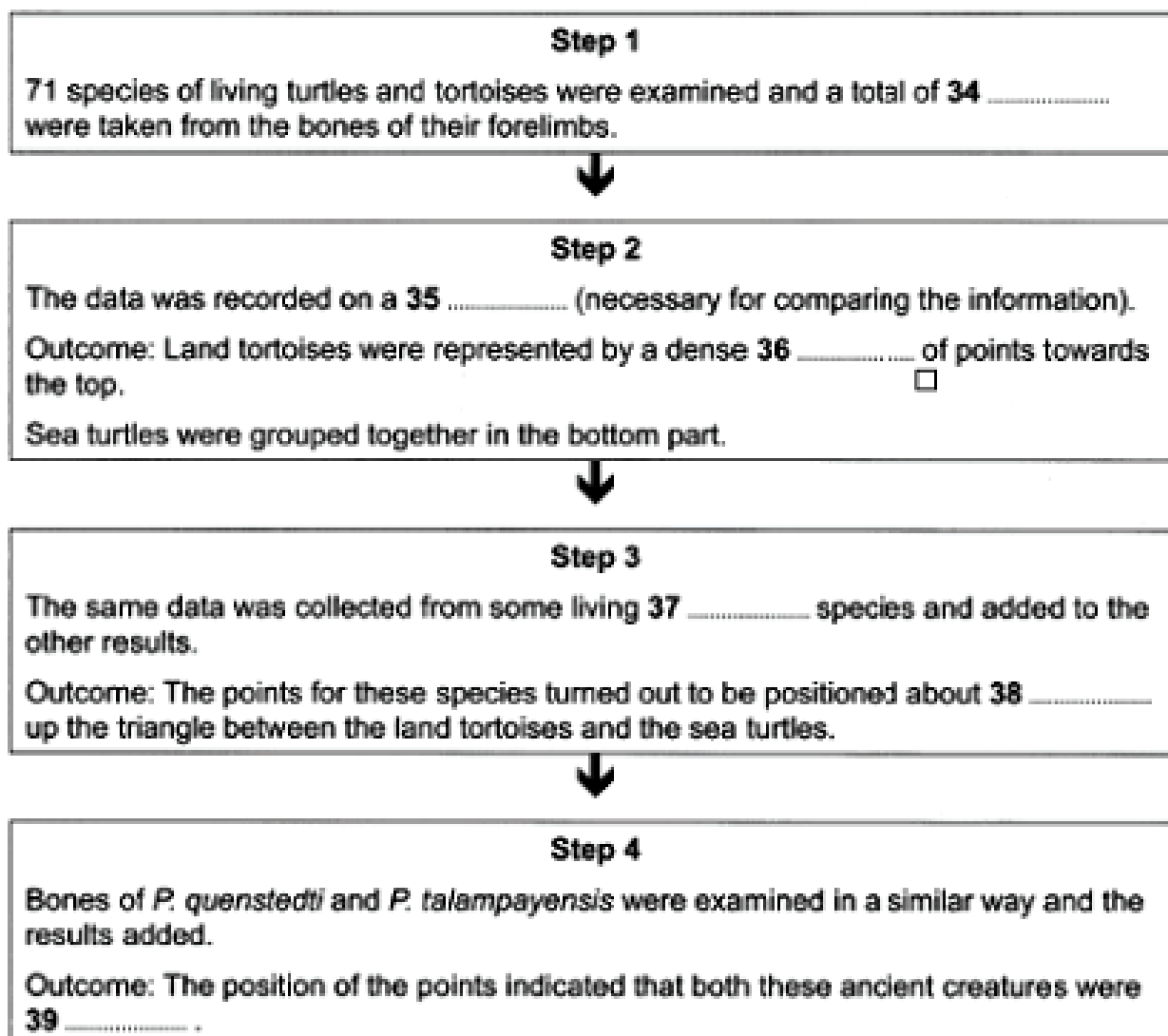
number of generations. Later ancestors still evolved back into the water and became sea turtles. And finally they returned yet again to the land as tortoises, some of which now live in the driest of deserts.

Complete the flow-chart below.

Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage for each answer.

Write your answers in boxes 34–39 on your answer sheet.

Method of determining where the ancestors of turtles and tortoises come from



Explanation for Q34 :-**Apply The Tips As Taught Above:**

34. Look at the keywords: 71, taken, total of, bones, forelimbs

At the beginning of paragraph 4, the writer argues that “Walter Joyce and Jacques Gauthier, at Yale University, obtained three measurements in these particular bones of 71 species of living turtles and tortoises.”

ANSWER: 3 measurements/three measurements

Source: Cambridge Book 7 -GT

Practice 2

Read the text below and answer Questions 22-27.

DEALING WITH YOUR OFFICE EMAILS

Email has completely changed the way we work today. It offers many benefits and, if used well, can be an excellent tool for improving your own efficiency. Managed badly, though, email can be a waste of valuable time. Statistics indicate that office workers need to wade through an average of more than 30 emails a day. Despite your best efforts, unsolicited email or spam can clutter up the most organised inbox and infect your computer system with viruses. Here we give you guidance on protecting yourself.

Prioritising incoming messages

If you are regularly faced with a large volume of incoming messages, you need to prioritise your inbox to identify which emails are really important. If it is obvious spam, it can be deleted without reading. Then follow these steps for each email:

- Check who the email is from. Were you expecting or hoping to hear from the sender? How quickly do they expect you to respond?
- Check what the email is about. Is the subject urgent? Is it about an issue that falls within your sphere of responsibility, or should it just be forwarded to someone else?

- Has the email been in your inbox for long? Check the message time.

An initial scan like this can help you identify the emails that require your prompt attention. The others can be kept for reading at a more convenient time.

Replying in stages

Having prioritised your emails, you can answer them in stages, first with a brief acknowledgement and then a more detailed follow-up. This is particularly advisable when dealing with complicated matters where you don't want to give a rushed answer. If you decide to do this, tell the recipient a definite date when you'll be able to get back to him or her and try to keep to this wherever possible.

Some emails are uncomplicated and only require a brief, one line answer, so it's a good idea to reply to these immediately. For example, if all you need to say is, 'Yes, I can make the 10.00 meeting', or 'Thanks, that's just the information I needed', do it. If you are unable to reply there and then or choose not to, let the sender know that you've received the message and will be in touch as soon as possible.

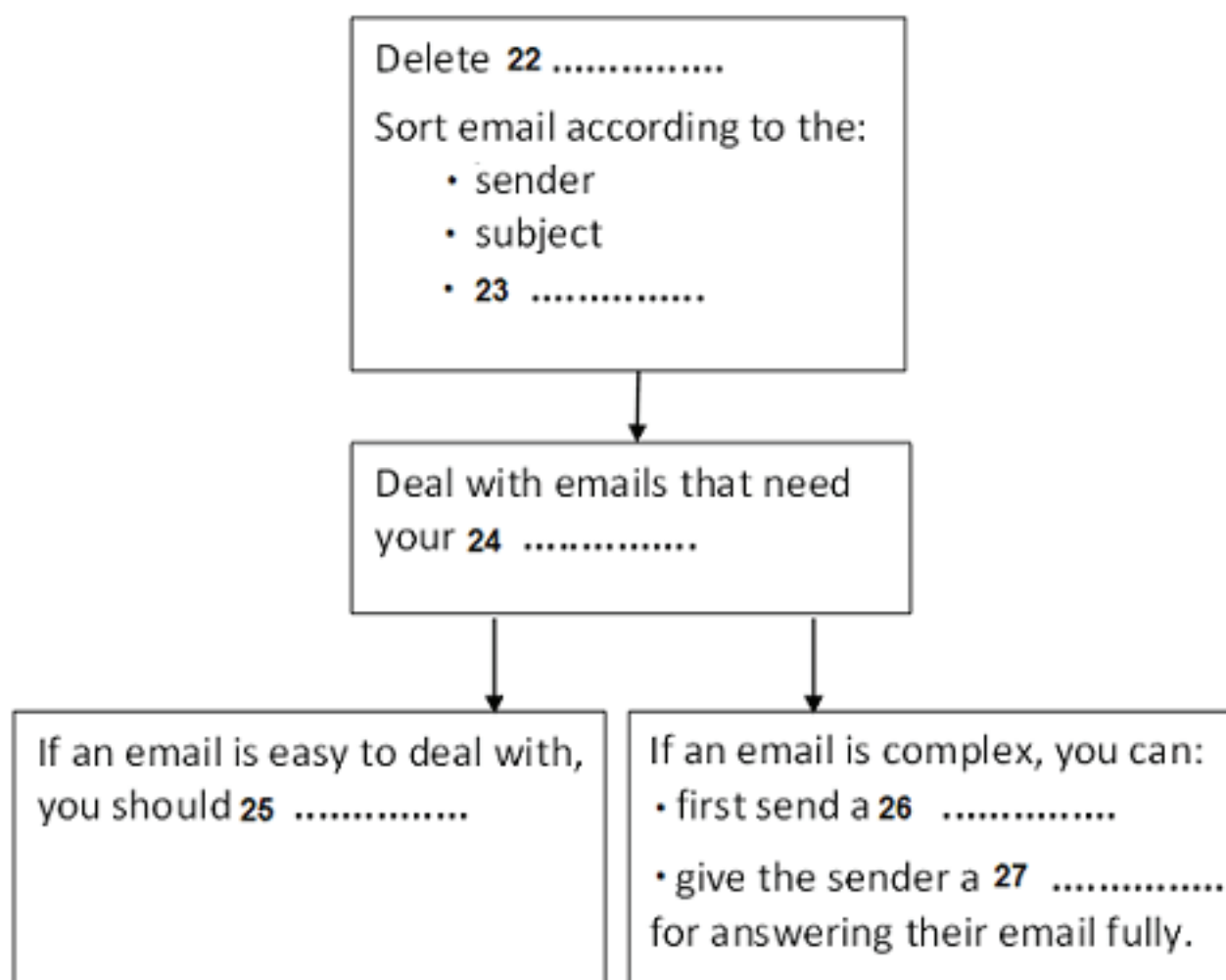
Questions 22-27

Complete the flowchart below.

Choose **NO MORE THAN TWO WORDS** from the text for each answer.

Write your answers in boxes 22-27 on your answer sheet.

in boxes 22-27 on your answer sheet.



Source: Cambridge Book 13 -GT

Practice 3

BORDER CROSSING FOR COMMERCIAL VEHICLES

This Border Crossing Guide is designed for drivers and motor carriers operating commercial vehicles at Michigan's international border crossings. This information will help you cross the border from the US into Canada, and from Canada into the US.

Your first point of contact at the border consists of Primary Inspection. The best way to clear customs at Primary Inspection is to make sure Customs gets information about your shipment before you set off, using the Pre-Arrival Processing System (PAPS). When using this you need to provide information about your shipment, and you also need to send proof of a current annual inspection for your vehicle, tractor and trailer.

Before you arrive at the border, make sure you have all your paperwork up to date and ready to present at Primary Inspection. You'll need a photo ID in addition to your birth certificate or passport. Drivers must also turn on interior cab lights and open all interior drapes or blinds to sleeper areas for easy inspection.

If all of your paperwork is in order and was processed ahead of time, you will be released at the primary lane and this may be your only stop. If you are not a Canadian or US citizen, a visa is obligatory and you will also be required to complete an I-94 card. I-94 cards are available only at border crossings into the United States. Drivers who clear customs at Primary Inspection will be instructed to report to Immigration to fill out the I-94 card and receive verbal clearance from a US official to proceed into the United States. The charge for the I-94 card is \$6.

If your paperwork is not in order, you will be directed to Secondary Inspection. When you get there, look for the signs for Truck Inspection and follow these.

Complete the flow-chart below.

*Choose **NO MORE THAN TWO WORDS** from the text for each answer.*

Write your answers in boxes 15–20 on your answer sheet.

Procedure for border crossing

Before setting off

To speed up the border crossing, use PAPS.

For this, send your **15** details and current vehicle inspection documents.



Before arriving at the border

Check that documents such as **16** and birth certificate/passport are ready for inspection.

Make sure the **17** are on inside the vehicle.

Check that the **18** in the vehicle can be easily seen.



At the border (Primary Inspection)

This may be the only stop if paperwork is in order.

Non US/Canadian citizens must have a visa, and go to the 19 area to complete an I-94 card (there is a small 20 for this) and to receive verbal clearance.

**At the border (Secondary Inspection)**

If there is a problem with paperwork, you will be sent to Truck Inspection.

Source: <http://ieltsionlinetests.com/>, *Border crossing for commercial vehicles*

Practice 4

Criminal Rehabilitation: A Difficult Issue

When convicted criminals have served long terms of imprisonment, it is obvious that, upon their release, one cannot necessarily expect them to be reformed and able to reintegrate into society. In the potentially rough and violent ganglands of prisons, quite the opposite may occur, which raises a difficult dilemma in the criminal justice system. To maintain social order, those who break the law are expected to be punished, yet that same maintenance of order means that rehabilitation must be given a high emphasis.

The ethic of rehabilitation is based on the assumption that criminal tendencies are not necessarily permanent, and that former inmates can successfully lead lives in which they contribute positively to society. The ultimate goal is to prevent them from reoffending, an event technically known as criminal recidivism. Prisons therefore contain systems of education or therapy, as well as assessment to determine whether inmates have truly developed remorse for past misdeeds, an ability to reintegrate into society,

and intentions to do so. Assessing this accurately is a difficult issue, and it must be accepted that there are some people who can never be rehabilitated, however much we try.

The term psychopath is often used here, one of the key determiners of this condition being an inability to learn from past mistakes. Techniques towards improving their behaviour are thus unlikely to work. Obviously, recidivism is highly correlated with this condition, yet studies have shown that psychopathic prisoners are equally likely to be released from prisons as non-psychopathic ones. This is often explained by the fact that psychopathic individuals develop better strategies at disguising their intentions, and become more adept at tricking others. Treatment and therapy merely give them knowledge of penal and judicial procedures, which they can then twist to their advantage, colloquially known as 'system cracking'.

Cases such as these reveal the biggest problem with rehabilitation: the difficulty of reading the deepest intentions of human beings. Nevertheless, inmates will be released, and consequently need assistance for their reintegration into society. This is most commonly done through parole, which involves serving the remainder of a sentence outside of prison. This is different from probation, which is used instead of prison sentences, and consequently places greater restrictions upon the subject. A similar system is supervised release, where the subject faces the same restrictions as probation, but only after serving the entire prison sentence. Whatever the case, the parole officer will monitor the released inmate, offering support and assistance wherever possible.

The decision about whether to grant parole usually lies with a parole board. Members may be judges, psychiatrists, criminologists, and appointed citizens from the local community. The common factor is that they all have a good education, and are judged to be of high moral standing. Yet again, trying to assess the inmate's psychological state and what intentions lie within is problematic at best. Good conduct while inside the prison system is the most obvious prerequisite, but other factors based on the support networks existing outside also play a role. Having already established a permanent residence, and having gained employment, is usually mandatory.

Upon being released on parole, there are still a variety of regulatory conditions to be met. These include the obvious, such as obeying the law, and contacting the parole officer at specified intervals, but may be more individual and specific, such as the non-use of drugs and alcohol, and return to the home residence before a certain time (known as a curfew). Upon ignoring any of these, an arrest warrant is issued, parole time is stopped, and there follows a parole violation hearing. The parole board then makes a decision about whether to revoke the parole (which sees the subject reincarcerated) or to allow parole to continue. As mentioned, such decisions are not a hard science, and mistakes can be made.

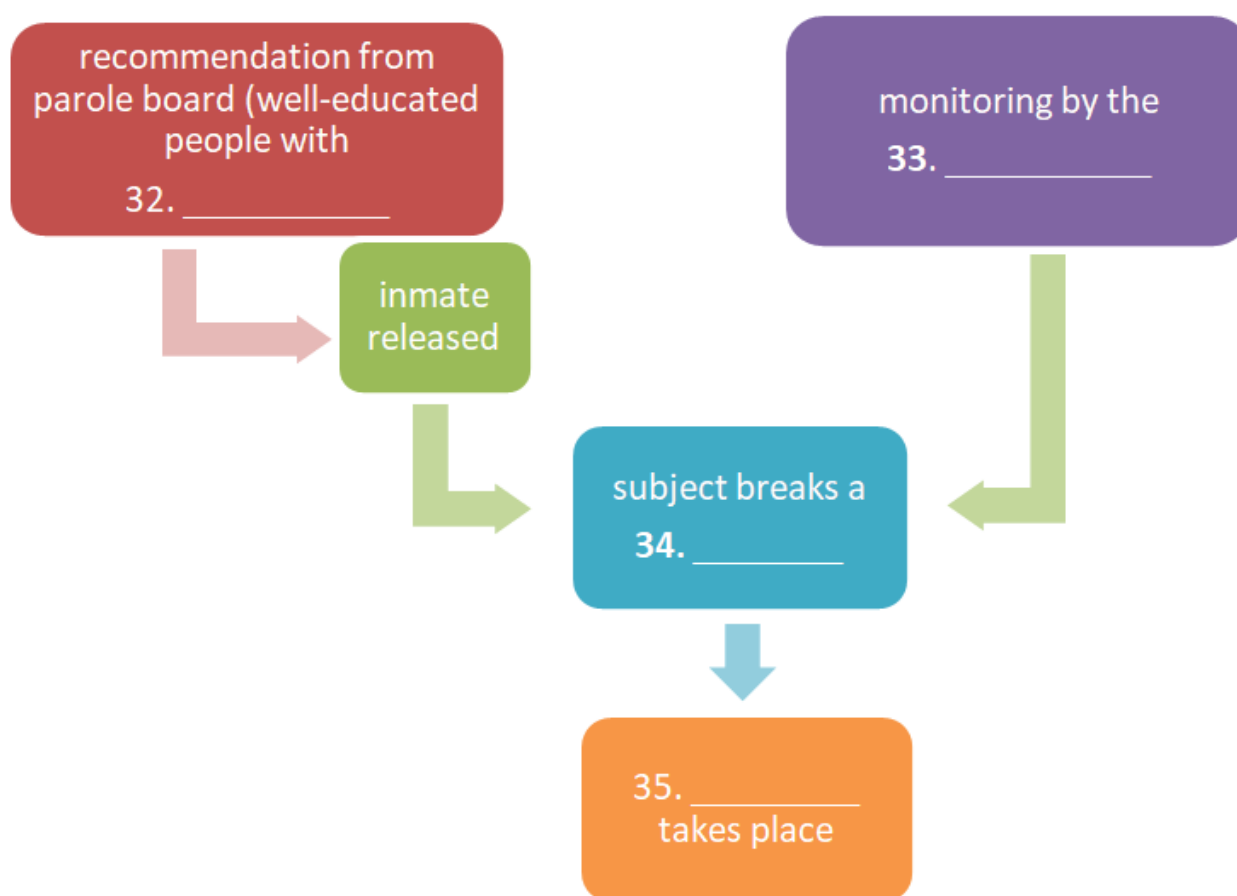
It is this which can make parole a controversial and politically charged issue. It only takes one highly publicised crime from a person on parole to sway public opinion violently against this system. Thus, the political will is often lacking, which has seen, for example, some US states abolish the parole system completely, and others having done so for specific offences. This is often a response to public pressure, rather than a considered assessment of the pros and cons. As always, the same argument applies without parole as an intermediate step, released inmates may face an uphill battle to avoid recidivism, costing society much more in the longer term.

A more innovative method to encourage rehabilitation is 'time off for good behaviour'. For each year of imprisonment, it automatically allots inmates who exhibit good behaviour a certain number of days. This means that, year after year, the 'good time' is accrued, resulting in an eventual release perhaps one third of the sentence earlier. However, if the inmates commit more than a certain number of infractions, or particularly serious ones, they then forfeit their time, and must complete the full duration of their sentence.

Complete the flowchart.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

A failure of parole



Source: Cambridge Book 12 -GT

Practice 5

How to run a successful project

A project manager's main task is to bring a particular project to completion, both on time and within budget. There are many factors that can cause a project to veer off its tracks, but steps can be taken to ensure that your project experiences as little disruption as possible.

If you get everything down in writing at the beginning of the project, you have an excellent foundation to build upon. Change is inevitable, but you have to maintain control. This is critical to avoid problems of 'scope creep', which is when the company paying for the project asks for 'just one more little thing' repeatedly, until the project becomes unmanageable.

Gather your human resources, and make sure that their skills align with their roles. This is an important first step: if you assign the wrong person to a task, you are reducing your chances of success.

Make sure each team member is clear on what is expected from them and when. Encourage them to ask questions to clarify anything that may be uncertain, and to always come to you whenever something seems to be out of place or going wrong. Clear communication is critical.

Make sure the whole team and the client company grasp the project's limitations in terms of its achievable outcomes. You can finish a task successfully and on time as long as expectations are reasonable.

How can you know if your project is going to be successful if you don't have any way of measuring success? You will need interim milestones, especially for a long-term project, so that you can determine if you are staying on track or straying from the project's goals.

Hopefully you have defined the more likely risks up front during the project preparation, so you should now put contingency plans in place for certain occurrences. If you can see when a risk is imminent, you can take preventive action to avoid it, but be ready to halt a project if the risk becomes unacceptable.

Once a project has been completed, it's important to write a report, even if it is only for internal purposes. You can pinpoint what went right or wrong, determine what could have been done differently, and establish the best practices for use in future undertakings.

Complete the flow-chart below.

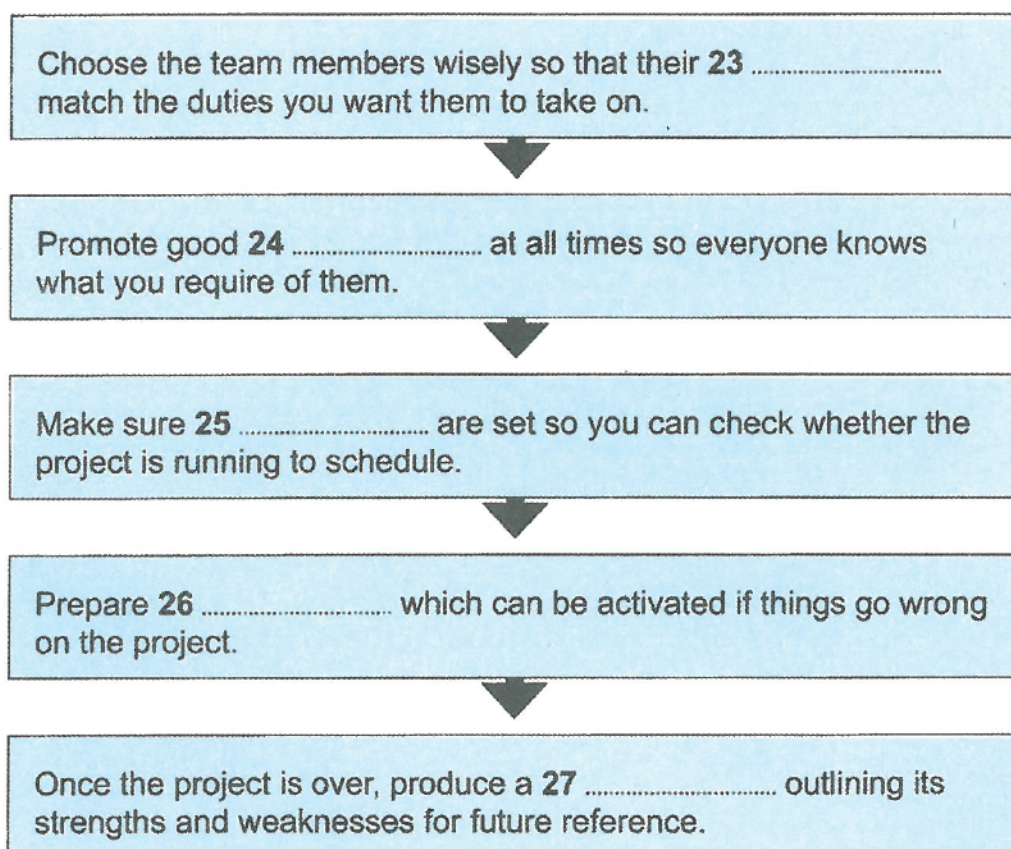
Choose **NO MORE THAN TWO WORDS** from the text for each answer.

Write your answers in boxes 21–27 on your answer sheet.

How to run a successful project

Bear in mind that your aim should be to keep to both the agreed deadline and the **21** for the project.

Fix the details at the start to prevent what is called **22**
– the client asking for more and more.



Source: <http://ieltsonline-tests.com/>, *How to run a successful project*

Practice 6

The Australian Visa Application Process Explained

Applications for Australian visas are now accepted online. You should, however, be in possession of the following documents before you embark on the application process: (i) your current passport (valid for at least 6 months at the date of application), (ii) your sponsor and associated nomination approval number or transaction reference number [(ii) only applies to Long-Stay Temporary Business Visa applicants]. In order to proceed online, you should also have up-to-date internet browsers loaded on your computer and an internationally accepted credit card to pay the application charge.

Before embarking on the application process, it is recommended that you understand a little more about what this process entails and the steps

involved. That is why this guide has been designed. Please read on to get a better understanding of what will happen next once you start your application.

The first and most important thing to do is to check that the visa you have selected is appropriate to your circumstances. At the start of the online application, you will be asked a number of questions that will help you to confirm that you have chosen the right kind of visa to apply for. Please remember that certain visas are not available to apply for over the internet and may require your presence at your local Australian embassy or consulate should you wish to proceed with your application. In general, however, most people will find that they can apply online as our most common types of visas (working-holiday, student, employer-sponsored, etc.) can be accessed over the internet.

Before starting the application process officially (by clicking the Apply Online button), please read all the accompanying guidelines and information about the type of visa application you have chosen to make. These details will appear on Page 1 of the online application and should be read through thoroughly before the applicant continues and the process officially starts. It is also necessary to accept the terms and conditions before you continue by checking the 'I Agree' box.

Once you have moved on to the actual application form itself, there will be between 5 and 9 short screens to complete, depending on the type of visa you are applying for. As a rough estimate, allow yourself about 4 minutes to fill in the information on each screen. On this basis, it should take you a maximum of about 40 minutes to complete the form. All applications will ask you for your personal details, namely your passport number, travel document details, name and current place of residence, contact information, declarations with respect to your health and character, etc.

Applicants for Long-Stay Business visas will also be asked for details of their business sponsor. Student visa applicants should outline their education history and their intended course of study in Australia. Applicants for Tourist visas should outline their travel plans, reason for visiting and employment status, and so on. Once you have completed all the screens that form part of

the application form, answering all questions as truly and honestly as possible, you will be given the opportunity to review the information you have supplied and print a copy of the visa application for reference purposes if you wish.



You are now ready to submit your application, but there is one more thing you must do before the option to submit appears - make the payment. You will be prompted to enter your payment information after you have confirmed that all the details entered in your application are, to the best of your knowledge, true. When the bank accepts payment, a Transaction Reference Number will be automatically generated. You should make a note of this and keep it safe as it should be quoted when making any inquiries related to your application in the future. Once the application has been submitted, you may be prompted to download and print certain health forms, but only if you are applying from overseas (not applicable to those applying from inside of Australia itself). Please follow any other requirements as stipulated on the screen as special pre-entry conditions must be met for some types of visas.

Most applications will be processed electronically and notification will be sent by post or email (whichever method you selected on your application form) within the time frame outlined on screen during your application. For student visas, that's about 10 working days. Tourist visas are normally finalised in less than two weeks. Working-holiday visas take no more than 2 days and so on. Occasionally, it may be necessary for a representative from the immigration department to contact you, and, in some cases, further health checks, information, or a formal interview may be required.

Complete the flow-chart below.

Write **NO MORE THAN THREE WORDS AND/OR A NUMBER** from the passage for each answer.

Online Application Process

<p>(i) Complete the onscreen questionnaire to confirm you have chosen the correct type or visa for your circumstances.</p>		<p>REMEMBER Not all types of visa applications can be accessed 27 _____</p>
<p>↓</p>		
<p>(ii) Click Apply Online. Read the guidelines on Page 1 on how to apply carefully. Then, to start the actual application process, tick the 28 _____ once you have familiarised yourself with, and if you accept, the 29 _____</p>		<p>REMEMBER Allow yourself approximately 31 _____ at most to complete the form, or 4 minutes for 32 _____</p>
<p>↓</p>		
<p>(iii) You are now in the main application form. You will have to fill in information on between 5 and 9 short screens, depending on which visa you want. Fill in the form carefully and answer all questions 30 _____</p>		
<p>↓</p>		
<p>(iv) 33 _____ the details you have entered and, if you wish, print a copy of the application for your 34 _____</p>		

Source: <http://ieltsonline-tests.com/>

Practice 7

Production line

A. The ‘production line’ system of creating and assembling goods has for many years been the standard mode of operation for many industries. Cars, electronic equipment, packaging – many diverse companies have employed the same methods, and most have hit two main problems. The first is that unscheduled maintenance required on essential machinery has often held up production all along the line, and the second is the significant impact on employee morale. This has given rise to the increasingly adopted method of Total Productive Maintenance (TPM) – a maintenance program which governs the maintenance of plants and equipment. The goal of the TPM program is to markedly increase production while, at the same time, increasing employee morale and job satisfaction.

B. The concept of TPM was first developed in Japan in the late 1970s, only moving to the western world a decade later, initial success of the programme in countries such as Australia was limited, but in the late 1990s a ‘westernised’ version of TPM was launched. TPM brings maintenance into focus as a necessary and vitally important part of the business. It is no longer regarded as a non-profit activity. Down time for maintenance is scheduled as a part of the manufacturing day and, in some cases, as an integral part of the manufacturing process. The goal is to keep emergency and unscheduled maintenance to a minimum.

C. TPM involves directing participating companies and industries to move away from traditional methods of production to more efficient mechanisms. This is evident in TPM’s operational focus on lean production rather than mass production. The lean approach favours flexibility within a team, rather than the specialisation of labour Introduced with mass production. It also involves a shift away from being driven by the financial department of the company to a more customer focused goal. Another goal of the TPM method is to introduce quality control not by being overseen by managers, but rather by engendering a sense of responsibility amongst all staff; a move from autocratic management to empowerment. This shift means that shop floor

workers are being able to take a sense of pride in their work, and with that comes the desire to perform well ultimately leading to higher productivity for the company.

D. In order to apply the concepts of TPM, a company will have to work through a number of stages. First, there must be universal agreement that the system has the potential to be successful within the company. Then a specific person or team needs to be appointed to coordinate the changes required to apply TPM methodologies, an aim that begins with training and education for all employees. Once the coordinator is convinced that the workforce is sold on the TPM program and that they understand it and its implications, the first action teams are formed. These teams are usually made up of people who have a direct Impact on the problem being addressed. Operators, maintenance personnel, shift supervisors, schedulers, and upper management might all be included on a team. Each person becomes a stakeholder in the process and is encouraged to do his or her best to contribute to the success of the team effort. Usually, the TPM coordinator heads the teams until others become familiar with the process and natural team leaders emerge.

E. The concept of TPM is built on what are referred to as the three pillars – work area management, risk management and equipment management. An illustration of these pillars is highlighted in the importance of recognising and eliminating defects within the machinery used in a company. This refers to issues such as the accumulation of dust and grime on equipment, gauges that are broken or too dirty to read clearly and missing or loose bolts, nuts and screws. Using a sample company, statistics collected from a three month period indicate a substantial reduction in machine maintenance costs, falling by \$ 30,000 between 1996 and 1999. At the same time, the effectiveness of the equipment increased significantly, with machine uptime rising by almost 2096 over the same period.

F. Many observers have identified similarities between TPM and an earlier industry concept – total quality management (TQM), and in many respects, TPM and TQM resemble each other. Both require total commitment to the program by upper level management, and both promote the empowerment

of all employees to initiate corrective action, Additionally, both processes require a long range outlook, as it may take a year or more to implement and is an ongoing process. Changes in employee mind-set toward their job responsibilities must take place as well. Indeed, initial results for at least the first quarter may actually lead to reduced productivity while changes are put into effect.

G. The difference between the two systems, however, becomes apparent when looking at what each system considers to be a priority. TQM is essentially an output focused system, whereas TPM is singular in that it looks more at input – the equipment used and the causes of real or potential maintenance failures. Also, although both programme stress the need for complete involvement of all parties, TPM stresses the equal importance of all levels of employee, whereas TQM has a more traditional focus on management structure. The main target of both is also slightly different; whereas TQM aims to improve quality, TPM aims to reduce wastage and minimise losses.

Complete the flowchart.

Choose **NO MORE THAN TWO WORDS** from Reading Passage 2 for each answer.

Agreement about the 21 _____ offered
by implementing TPM
↓
Nomination/ establish of 22 _____
↓
Education and training of workforce
↓
Creation of 23 _____
↓
Emergence of 24 _____ to head group

Source: <http://ieltsionlinetests.com/>, *Production Line*

Practice 8

Hazard Management

In many industrial or manufacturing workplaces, managing hazards is essential for a successful health and safety system. Hazard management is an ongoing process that goes through five different stages, with each step becoming a stage on a tire hazard management plan.

The first step is to identify potential hazards, remembering that hazards are classed as anything that could potentially cause harm not only to people, but also to the organisation. To illustrate, an industrial accident can cause an injury to employees, but can also result in lost production, broken machinery and wasted resources for the company. In many cases, local and national government legislation has strict regulations concerning hazard identification, and in many industries, especially those perceived to be dangerous, severe penalties can be incurred by companies overlooking such hazard identification.

Having identified the potential hazards, the next step is to assess the hazard; that is, to consider to what extent they are significant. To a degree, this is a subjective aspect of risk management, as what may be seen by one person to be a significant issue can be seen by another to be an acceptable feature of a workplace. To allow for a degree of uniformity, in this stage, hazards are rated using risk assessment tables. These tables work by assigning a point value to three areas. The first is the exposure score, which assesses how often people are exposed to the hazard. If this is a continuous risk which employees face all the time, the score will be high; if the exposure is very rare, the points given will be substantially lower. The score is then multiplied by the likelihood of this hazard causing an injury, ranging from 'Definite' (it happens all the time) down to 'Unlikely' (it hasn't happened yet). This is referred to as the chances rating.

The sum of the first two scores is again multiplied by the effects score,

which considers how serious any accident might be. This can be rated from 1 (requiring minor first aid) right up to multiple deaths (classed as disaster). All 3 scores then give the final risk assessment result. Generally, a result in excess of 100 points requires caution, but a result of 200 hundred or more is classed as high priority. Certain jobs are, for the most part, permanently garner scores of over 200 (fire-fighting, for example) and in many cases additional payments, informally known as 'danger money', are applied.

The third step on the hazard management plan is to control hazards that have been identified. There are 3 stages to hazard control. The first aim is to eliminate the hazard – that is, to get rid of it altogether. This can be achieved by removing debris or unnecessary obstacles from the workplace. Often, however, this is not possible, so the next step is to isolate the hazard, to store it out of the way. For example, a cleaning company cannot completely eliminate hazardous chemicals, but they can keep these chemicals locked away until required. Isolating hazards is an ongoing process which requires companies to have very clear and enforced guidelines regarding safe storage of potentially hazardous products.

If the hazards cannot be isolated, then the aim must be to minimise the risk. This is achieved through staff training in safe handling techniques and best practices, as well as the provision of personal protection equipment (PPE). PPE commonly includes items such as gloves, overalls and footwear with steel reinforced areas.

The fourth and fifth steps on a hazard management plan are connected – to 'record and review' the hazard. The recording is done in the hazard register, and this register is continually reviewed to ensure best practices are maintained. If a severe accident does occur in the workplace, it is the hazard register that investigators often first turn to, to see if the issue had previously been reported and if so what the company did about the hazard.

It is worth noting that since more rigorous application of hazard management systems, workplace accidents have experienced a significant decline in many industries previously identified as 'high risk'.

Complete the flowchart

Choose *NO MORE THAN TWO WORDS* from Reading Passage 3 for each answer.

STAGES OF HAZARD CONTROL

1 st step is to 38 _____ if possible
⇓
Locate the hazard (e.g. 39 _____ it out of the way)
⇓
40 _____ hazard by wearing protective clothing and following safety training

Source: <http://ieltsontinetests.com/>, *Hazard Management*

Table Completion

Definition: You will be provided with an incomplete table which summarises or paraphrases information given in the reading text. The information in table form may be organised differently from the way in which it appears in the text, for example chronologically instead of in order of importance. The task is to complete the gaps provided.

Strategy:

1. Read the instructions carefully.
2. Look at the table and especially any headings. Decide which is the most useful way to read the table. In this case you need to read it horizontally to answer the questions. Glance at the other information given in the table to get an idea of what information you will be searching for when you read, paying special attention to any important keywords present.

3. Look at the first row under the headings. Decide what key ideas/words you will need to search for as you skim the reading text. Decide also what information you will need to complete the first gap.
4. Skim the text for the appropriate paragraph or section.
5. Read that section in detail and decide on the word or words to fill the gap.

Tips:

1. You should complete flow charts/ diagrams/ tables that paraphrase sentences from the text.
2. You're given a word limit.
3. Questions MOSTLY follow the order of the text.
4. Use keywords to look for answers.

IN-CLASS CONTENT

Exercise 1

Questions 1 – 7

Complete the table below.

Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage for each answer.

Changes in Industrial Britain

The spread of railways stimulated communication, and Rowland Hill's standardization of postal charges in 1839 saw a boom in mail services. But this was nothing compared to the revolution of the telegraph. If you think the Internet is big then just imagine how much bigger it would seem if you had never before seen a computer or telephone. That's what the telegraph was to the Victorians. If rail travel shrank the country, the telegraph crushed it. It opened in the 1840s and soon went stratospheric – within ten years exchanging telegrams had become part of everyday life. By the mid-1860s London was connected with New York and by the mid-1870s messages could be exchanged between London and Bombay in minutes.

Year	Event in Britain
1839	Changes to 1 _____ resulted in an increase in the delivery of mail.
1840s	The beginning of the 2 _____.
3 _____	You could send messages of 4 _____.
5 _____	Only 6 _____ for messages to arrive from 7 _____.

Source: <https://www.ieltsanswers.com/>, *Changes in industrial Britain*

Practice Exercises

Practice 1

The Birth of Scientific English

World science is dominated today by a small number of languages, including Japanese, German and French, but it is English which is probably the most popular global language of science. This is not just because of the importance of English-speaking countries such as the USA in scientific research; the scientists of many non-English-speaking countries find that they need to write their research papers in English to reach a wide international audience. Given the prominence of scientific English today, it may seem surprising that no one really knew how to write science in English before the 17th century. Before that, Latin was regarded as the lingua franca for European intellectuals.

The European Renaissance (c. 14th-16th century) is sometimes called the 'revival of learning', a time of renewed interest in the 'lost knowledge' of

classical times. At the same time, however, scholars also began to test and extend this knowledge. The emergent nation states of Europe developed competitive interests in world exploration and the development of trade. Such expansion, which was to take the English language west to America and east to India, was supported by scientific developments such as the discovery of magnetism (and hence the invention of the compass), improvements in cartography and - perhaps the most important scientific revolution of them all - the new theories of astronomy and the movement of the Earth in relation to the planets and stars, developed by Copernicus (1473-1543).

England was one of the first countries where scientists adopted and publicised Copernican ideas with enthusiasm. Some of these scholars, including two with interests in language - John Wallis and John Wilkins - helped found the Royal Society in 1660 in order to promote empirical scientific research.

Across Europe similar academies and societies arose, creating new national traditions of science. In the initial stages of the scientific revolution, most publications in the national languages were popular works, encyclopaedias, educational textbooks and translations. Original science was not done in English until the second half of the 17th century. For example, Newton published his mathematical treatise, known as the *Principia*, in Latin, but published his later work on the properties of light - *Opticks* - in English.

There were several reasons why original science continued to be written in Latin. The first was simply a matter of audience. Latin was suitable for an international audience of scholars, whereas English reached a socially wider, but more local audience. Hence, popular science was written in English.

A second reason for writing in Latin' may, perversely, have been a concern for secrecy. Open publication had dangers in putting into the public domain preliminary ideas which had not yet been fully exploited by their 'author'. This growing concern about intellectual property rights was a feature of the period - it reflected both the humanist notion of the individual, rational scientist who invents and discovers through private intellectual labour, and the growing connection between original science and commercial

exploitation. There was something of a social distinction between 'scholars and gentlemen' who understood Latin, and men of trade who lacked a classical education. And in the mid-17th century it was common practice for mathematicians to keep their discoveries and proofs secret, by writing them in cipher, in obscure languages, or in private messages deposited in a sealed box with the Royal Society. Some scientists might have felt more comfortable with Latin precisely because its audience, though international, was socially restricted.

Doctors clung the most keenly to Latin as an 'insider language'.

A third reason why the writing of original science in English was delayed may have been to do with the linguistic inadequacy of English in the early modern period.

English was not well equipped to deal with scientific argument. First, it lacked the necessary technical vocabulary. Second, it lacked the grammatical resources required to represent the world in an objective and impersonal way, and to discuss the relations, such as cause and effect, that might hold between complex and hypothetical entities.

Fortunately, several members of the Royal Society possessed an interest in language and became engaged in various linguistic projects. Although a proposal in 1664 to establish a committee for improving the English language came to little, the society's members did a great deal to foster the publication of science in English and to encourage the development of a suitable writing style. Many members of the Royal Society also published monographs in English. One of the first was by Robert Hooke, the society's first curator of experiments, who described his experiments with microscopes in *Micrographia* (1665). This work is largely narrative in style, based on a transcript of oral demonstrations and lectures.

In 1665 a new scientific journal, *Philosophical Transactions*, was inaugurated. Perhaps the first international English-language scientific journal, it encouraged a new genre of scientific writing, that of short, focused accounts of particular experiments.

The 17th century was thus a formative period in the establishment of scientific English. In the following century much of this momentum was lost as German established itself as the leading European language of science. It is estimated that by the end of the 18th century 401 German scientific journals had been established as opposed to 96 in France and 50 in England. However, in the 19th century scientific English again enjoyed substantial lexical growth as the industrial revolution created the need for new technical vocabulary, and new, specialised, professional societies were instituted to promote and publish in the new disciplines.

Questions 38-40

Complete the table.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 38-40 on your answer sheet.

Science written in the first half of the 17th century		
Language used	Latin	English
Type of science	Original	38 _____
Examples	39 _____	Encyclopaedias
Target audience	International scholars	40 _____ but socially wider

Source: Cambridge Book 5

Explanation for Q38 :-**Apply the tips as taught above:**

38. Keywords: type of science, English

Paragraph 5 indicates that: "There were several reasons why original science continued to be written in Latin. The first was simply a matter of audience. Latin was suitable for an international audience of scholars, whereas English reached a socially wider, but more local audience. Hence, popular science was written in English."

Answer: Popular

Practice 2

The Impact of Wilderness Tourism

A

The market for tourism in remote areas is booming as never before. Countries all across the world are actively promoting their 'wilderness' regions - such as mountains, Arctic lands, deserts, small islands and wetlands - to high-spending tourists. The attraction of these areas is obvious - by definition, wilderness tourism requires little or no initial investment. But that does not mean that there is no cost. As the 1992 United Nations Conference on Environment and Development recognized, these regions are fragile (i.e. highly vulnerable to abnormal pressures) not just in terms of their ecology, but also in terms of the culture of their inhabitants. The three most significant types of fragile environment in these respects, and also in terms of the proportion of the Earth's surface they cover, are deserts, mountains and Arctic areas. An important characteristic is their marked seasonality, with harsh conditions prevailing for many months each year. Consequently, most human activities, including tourism, are limited to quite clearly defined parts of the year.

Tourists are drawn to these regions by their natural landscape beauty and the unique cultures of their indigenous people. And poor governments in these isolated areas have welcomed the new breed of 'adventure tourist', grateful for the hard currency they bring. For several years now, tourism has

been the prime source of foreign exchange in Nepal and Bhutan. Tourism is also a key element in the economies of Arctic zones such as Lapland and Alaska and in desert areas such as Ayers Rock in Australia and Arizona's Monument Valley.

B

Once a location is established as a main tourist destination, the effects on the local community are profound. When hill-farmers, for example, can make more money in a few weeks working as porters for foreign trekkers than they can in a year working in their fields, it is not surprising that many of them give up their farm-work, which is thus left to other members of the family. In some hill-regions, this has led to a serious decline in farm output and a change in the local diet, because there is insufficient labour to maintain terraces and irrigation systems and tend to crops. The result has been that many people in these regions have turned to outside supplies of rice and other foods.

In Arctic and desert societies, year-round survival has traditionally depended on hunting animals and fish and collecting fruit over a relatively short season. However, as some inhabitants become involved in tourism, they no longer have time to collect wild food; this has led to increasing dependence on bought food and stores. Tourism is not always the culprit behind such changes. All kinds of wage labour, or government handouts, tend to undermine traditional survival systems. Whatever the cause, the dilemma is always the same: what happens if these new, external sources of income dry up?

The physical impact of visitors is another serious problem associated with the growth in adventure tourism. Much attention has focused on erosion along major trails, but perhaps more important are the deforestation and impacts on water supplies arising from the need to provide tourists with cooked food and hot showers. In both mountains and deserts, slow-growing trees are often the main sources of fuel and water supplies may be limited or vulnerable to degradation through heavy use.

C

Stories about the problems of tourism have become legion in the last few years. Yet it does not have to be a problem. Although tourism inevitably affects the region in which it takes place, the costs to these fragile environments and their local cultures can be minimized. Indeed, it can even be a vehicle for

reinvigorating local cultures, as has happened with the Sherpas of Nepal's Khumbu Valley and in some Alpine villages. And a growing number of adventure tourism operators are trying to ensure that their activities benefit the local population and environment over the long term.

In the Swiss Alps, communities have decided that their future depends on integrating tourism more effectively with the local economy. Local concern about the rising number of second home developments in the Swiss Pays d'Enhaut resulted in limits being imposed on their growth. There has also been a renaissance in communal cheese production in the area, providing the locals with a reliable source of income that does not depend on outside visitors.

Many of the Arctic tourist destinations have been exploited by outside companies, who employ transient workers and repatriate most of the profits to their home base. But some Arctic communities are now operating tour businesses themselves, thereby ensuring that the benefits accrue locally. For instance, a native corporation in Alaska, employing local people, is running an air tour from Anchorage to Kotzebue, where tourists eat Arctic food, walk on the tundra and watch local musicians and dancers.

Native people in the desert regions of the American Southwest have followed similar strategy, encouraging tourists to visit their pueblos and reservations to purchase high-quality handicrafts and artwork. The Acoma and San Ildefonso pueblos have established highly profitable pottery businesses, while the Navajo and Hopi groups have been similarly successful with jewellery.

Too many people living in fragile environments have lost control over their economies, their culture and their environment when tourism has penetrated their homelands. Merely restricting tourism cannot be the solution to the imbalance, because people's desire to see new places will not just disappear. Instead, communities in fragile environments must achieve greater control over tourism ventures in their regions, in order to balance their needs and aspirations with the demands of tourism. A growing number of communities are demonstrating that, with firm communal decision-making, this is possible. The critical question now is whether this can become the norm, rather than the exception.

Questions 10-13

Complete the table below.

Choose **ONE WORD** from Reading Passage for each answer.

Write your answers in boxes 10-13 on your answer sheet.

The positive ways In which some local communities have responded to tourism	
People/Location	Activity
Swiss Pays d'Enhaut	Revived production of 10 _____
Arctic communities	Operate 11 _____ businesses
Acoma and San ildefonso	Produce and sell 12 _____
Navajo and Hopi	Produce and sell 13 _____

Source: Cambridge Book 5

Practice 3

Telepathy

Can human beings communicate by thought alone? For more than a century the issue of telepathy has divided the scientific community, and even today it still sparks bitter controversy among top academics

Since the 1970s, parapsychologists at leading universities and research institutes around the world have risked the derision of sceptical colleagues by putting the various claims for telepathy to the test in dozens of rigorous scientific studies. The results and their implications are dividing even the researchers who uncovered them.

Some researchers say the results constitute compelling evidence that telepathy is genuine. Other parapsychologists believe the field is on the brink of collapse, having tried to produce definitive scientific proof and failed. Sceptics and advocates alike do concur on one issue, however: that the most impressive evidence so far has come from the so-called 'ganzfeld' experiments, a German term that means 'whole field'. Reports of telepathic experiences had by people during meditation led parapsychologists to suspect that telepathy might involve 'signals' passing between people that were so faint that they were usually swamped by normal brain activity. In this case, such signals might be more easily detected by those experiencing meditation-like tranquillity in a relaxing 'whole field' of light, sound and warmth.

The ganzfeld experiment tries to recreate these conditions with participants sitting in soft reclining chairs in a sealed room, listening to relaxing sounds while their eyes are covered with special filters letting in only soft pink light. In early ganzfeld experiments, the telepathy test involved identification of a picture chosen from a random selection of four taken from a large image bank. The idea was that a person acting as a 'sender' would attempt to beam the image over to the 'receiver' relaxing in the sealed room.

Once the session was over, this person was asked to identify which of the four images had been used. Random guessing would give a hit-rate of 25 per cent; if telepathy is real, however, the hit-rate would be higher. In 1982, the results from the first ganzfeld studies were analysed by one of its pioneers, the American parapsychologist Charles Honorton. They pointed to typical hit-rates of better than 30 per cent - a small effect, but one which statistical tests suggested could not be put down to chance.

The implication was that the ganzfeld method had revealed real evidence for telepathy. But there was a crucial flaw in this argument - one routinely overlooked in more conventional areas of science. Just because chance had been ruled out as an explanation did not prove telepathy must exist; there were many other ways of getting positive results. These ranged from 'sensory leakage' - where clues about the pictures accidentally reach the receiver - to outright fraud. In response, the researchers issued a review of all the ganzfeld studies done up to 1985 to show that 80 per cent had found statistically significant evidence. However, they also agreed that there were still too many problems in

he experiments which could lead to positive results, and they drew up a list demanding new standards for future research.

After this, many researchers switched to autoganzfeld tests - an automated variant of the technique which used computers to perform many of the key tasks such as the random selection of images. By minimising human involvement, the idea was to minimise the risk of flawed results. In 1987, results from hundreds of autoganzfeld tests were studied by Honorton in a 'meta-analysis', a statistical technique for finding the overall results from a set of studies. Though less compelling than before, the outcome was still impressive.

Yet some parapsychologists remain disturbed by the lack of consistency between individual ganzfeld studies. Defenders of telepathy point out that demanding impressive evidence from every study ignores one basic statistical fact: it takes large samples to detect small effects. If, as current results suggest, telepathy produces hit-rates only marginally above the 25 per cent expected by chance, it's unlikely to be detected by a typical ganzfeld study involving around 40 people: the group is just not big enough. Only when many studies are combined in a meta-analysis will the faint signal of telepathy really become apparent. And that is what researchers seem to be finding.

What they are certainly not finding, however, is any change in attitude of mainstream scientists: most still totally reject the very idea of telepathy. The problem stems at least in part from the lack of any plausible mechanism for telepathy.

Various theories have been put forward, many focusing on esoteric ideas from theoretical physics. They include 'quantum entanglement', in which events affecting one group of atoms instantly affect another group, no matter how far apart they may be. While physicists have demonstrated entanglement with specially prepared atoms, no-one knows if it also exists between atoms making up human minds. Answering such questions would transform parapsychology. This has prompted some researchers to argue that the future lies not in collecting more evidence for telepathy, but in probing possible mechanisms. Some work has begun already, with researchers trying to identify people who are particularly successful in autoganzfeld trials. Early results show that creative and artistic people do much better than average: in one study at the University of Edinburgh, musicians achieved a hit-rate of 56 per cent. Perhaps more tests

like these will eventually give the researchers the evidence they are seeking and strengthen the case for the existence of telepathy.

Questions 31-40

Complete the table below.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.

Write your answers in boxes 31-40 on your answer sheet.

Telepathy Experiments			
Name/Date	Description	Result	Flaw
Ganzfeld studies 1982	Involved a person acting as a 31 _____, who picked out one 32 _____ from a random selection of four, and a 33 _____, who then tried to identify it.	Hit-rates were higher than with random guessing.	Positive results could be produced by factors such as 34 _____ or 35 _____
Autoganzfeld studies 1987	36 _____ were used for key tasks to limit the amount of 37 _____ in carrying out the tests.	The results were then subjected to a 38 _____	The 39 _____ between different test results was put down to the fact that sample groups were not 40 _____ (as with most ganzfeld studies).

Source: Cambridge Book 8

Practice 4

Stepwells

A millennium ago, stepwells were fundamental to life in the driest parts of India. Although many have been neglected, recent restoration has returned them to their former glory. Richard Cox travelled to north-western India to document these spectacular monuments from a bygone era.

During the sixth and seventh centuries, the inhabitants of the modern-day states of Gujarat and Rajasthan in North-western India developed a method of gaining access to clean, fresh groundwater during the dry season for drinking, bathing, watering animals and irrigation. However, the significance of this invention – the stepwell – goes beyond its utilitarian application.

Unique to the region, stepwells are often architecturally complex and vary widely in size and shape. During their heyday, they were places of gathering, of leisure, of relaxation and of worship for villagers of all but the lowest castes. Most stepwells are found dotted around the desert areas of Gujarat (where they are called vav) and Rajasthan (where they are known as baori), while a few also survive in Delhi. Some were located in or near villages as public spaces for the community; others were positioned beside roads as resting places for travellers.

As their name suggests, stepwells comprise a series of stone steps descending from ground level to the water source (normally an underground aquifer) as it recedes following the rains. When the water level was high, the user needed only to descend a few steps to reach it; when it was low, several levels would have to be negotiated.

Some wells are vast, open craters with hundreds of steps paving each sloping side, often in tiers. Others are more elaborate, with long stepped passages leading to the water via several storeys built from stone and supported by pillars; they also included pavilions that sheltered visitors from the relentless heat. But perhaps the most impressive features are the intricate decorative sculptures that embellish many stepwells, showing activities from fighting and dancing to everyday acts such as women combing their hair and churning butter.

Down the centuries, thousands of wells were constructed throughout northwestern India, but the majority have now fallen into disuse; many are derelict and dry, as groundwater has been diverted for industrial use and the wells no longer reach the water table. Their condition hasn't been helped by recent dry spells: southern Rajasthan suffered an eight-year drought between 1996 and 2004.

However, some important sites in Gujarat have recently undergone major restoration, and the state government announced in June last year that it plans to restore the stepwells throughout the state.

In Patan, the state's ancient capital, the stepwell of Rani Ki Vav (Queen's Stepwell) is perhaps the finest current example. It was built by Queen Udayamati during the late 11th century, but became silted up following a flood during the 13th century. But the Archaeological Survey of India began restoring it in the 1960s, and today it's in pristine condition. At 65 metres long, 20 metres wide and 27 metres deep, Rani Ki Vav features 500 distinct sculptures carved into niches throughout the monument, depicting gods such as Vishnu and Parvati in various incarnations. Incredibly, in January 2001, this ancient structure survived a devastating earthquake that measured 7.6 on the Richter scale.

Another example is the Surya Kund in Modhera, northern Gujarat, next to the Sun Temple, built by King Bhima I in 1026 to honour the sun god Surya. It's actually a tank (kund means reservoir or pond) rather than a well, but displays the hallmarks of stepwell architecture, including four sides of steps that descend to the bottom in a stunning geometrical formation. The terraces house 108 small, intricately carved shrines between the sets of steps.

Rajasthan also has a wealth of wells. The ancient city of Bundi, 200 kilometres south of Jaipur, is renowned for its architecture, including its stepwells. One of the larger examples is Raniji Ki Baori, which was built by the queen of the region, Nathavatji, in 1699. At 46 metres deep, 20 metres wide and 40 metres long, the intricately carved monument is one of 21 baoris commissioned in the Bundi area by Nathavatji.

In the old ruined town of Abhaneri, about 95 kilometres east of Jaipur, is Chand Baori, one of India's oldest and deepest wells; aesthetically, it's perhaps one of the most dramatic. Built in around 850 AD next to the temple of Harshat Mata,

the baori comprises hundreds of zigzagging steps that run along three of its sides, steeply descending 11 storeys, resulting in a striking geometric pattern when seen from afar. On the fourth side, covered verandas supported by ornate pillars overlook the steps.

Still in public use is Neemrana Ki Baori, located just off the Jaipur–Delhi highway. Constructed in around 1700, it's nine storeys deep, with the last two levels underwater. At ground level, there are 86 colonnaded openings from where the visitor descends 170 steps to the deepest water source.

Today, following years of neglect, many of these monuments to medieval engineering have been saved by the Archaeological Survey of India, which has recognised the importance of preserving them as part of the country's rich history. Tourists flock to wells in far-flung corners of northwestern India to gaze in wonder at these architectural marvels from 1,000 years ago, which serve as a reminder of both the ingenuity and artistry of ancient civilisations and of the value of water to human existence.

Questions 9-13

Complete the table below

Choose **ONE WORD AND/OR A NUMBER** from the passage for each answer.

Write your answers in boxes 9-13 on your answer sheet.

Stepwells	Date	Features	Other notes
Rani Ki Vav	Late 11th century	As many as 500 sculptures decorate the monument	Restored in the 1990s Excellent condition, despite the 9 _____ of 2001.
Surya Kund	1026	Steps on the 10 _____ produce a geometric pattern Carved shrines.	looks more like a 11 _____ than a well.
Raniji Ki Baori	1699	Intricately carved monument	One of 21 baoris in the area commissioned by Queen Nathavatji

Chand Baori	850 AD	Steps take you down 11 storeys to the bottom	Old, deep and very dramatic Has 12 _____ which provide a view to the steps.
Neemrana Ki Baori	1700	Has two 13 _____ levels.	Used by public today

Source: Cambridge Book 10

Practice 5

Reducing the Effects of Climate Change

Mark Rowe reports on the increasingly ambitious geo-engineering projects being explored by scientists

A

Such is our dependence on fossil fuels, and such is the volume of carbon dioxide already released into the atmosphere, that many experts agree that significant global warming is now inevitable. They believe that the best we can do is keep it at a reasonable level, and at present the only serious option for doing this is cutting back on our carbon emissions. But while a few countries are making major strides in this regard, the majority are having great difficulty even stemming the rate of increase, let alone reversing it. Consequently, an increasing number of scientists are beginning to explore the alternative of geo-engineering — a term which generally refers to the intentional large-scale manipulation of the environment. According to its proponents, geo-engineering is the equivalent of a backup generator: if Plan A - reducing our dependence on fossil fuels - fails, we require a Plan B, employing grand schemes to slow down or reverse the process of global warming.

B

Geo-engineering has been shown to work, at least on a small localised scale. For decades, MayDay parades in Moscow have taken place under clear blue skies, aircraft having deposited dry ice, silver iodide and cement powder to

disperse clouds. Many of the schemes now suggested look to do the opposite, and reduce the amount of sunlight reaching the planet. The most eye-catching idea of all is suggested by Professor Roger Angel of the University of Arizona. His scheme would employ up to 16 trillion minute spacecraft, each weighing about one gram, to form a transparent, sunlight-refracting sunshade in an orbit 1.5 million km above the Earth. This could, argues Angel, reduce the amount of light reaching the Earth by two per cent.

C

The majority of geo-engineering projects so far carried out — which include planting forests in deserts and depositing iron in the ocean to stimulate the growth of algae - have focused on achieving a general cooling of the Earth. But some look specifically at reversing the melting at the poles, particularly the Arctic. The reasoning is that if you replenish the ice sheets and frozen waters of the high latitudes, more light will be reflected back into space, reducing the warming of the oceans and atmosphere.

D

The concept of releasing aerosol sprays into the stratosphere above the Arctic has been proposed by several scientists. This would involve using sulphur or hydrogen sulphide aerosols so that sulphur dioxide would form clouds, which would, in turn, lead to a global dimming. The idea is modelled on historic volcanic explosions, such as that of Mount Pinatubo in the Philippines in 1991, which led to a short-term cooling of global temperatures by 0.5 °C. Scientists have also scrutinised whether it's possible to preserve the ice sheets of Greenland with reinforced high-tension cables, preventing icebergs from moving into the sea. Meanwhile in the Russian Arctic, geo-engineering plans include the planting of millions of birch trees. Whereas the -regions native evergreen pines shade the snow and absorb radiation, birches would shed their leaves in winter, thus enabling radiation to be reflected by the snow. Re-routing Russian rivers to increase cold water flow to ice-forming areas could also be used to slow down warming, say some climate scientists.

E

But will such schemes ever be implemented? Generally speaking, those who are most cautious about geo-engineering are the scientists involved in the

research. Angel says that his plan is 'no substitute for developing renewable energy: the only permanent solution'. And Dr Phil Rasch of the US-based Pacific Northwest National Laboratory is equally guarded about the role of geo-engineering: 'I think all of us agree that if we were to end geo-engineering on a given day, then the planet would return to its pre-engineered condition very rapidly, and probably within ten to twenty years. That's certainly something to worry about.'

F

The US National Center for Atmospheric Research has already suggested that the proposal to inject sulphur into the atmosphere might affect rainfall patterns across the tropics and the Southern Ocean. 'Geo-engineering plans to inject stratospheric aerosols or to seed clouds would act to cool the planet, and act to increase the extent of sea ice,' says Rasch. 'But all the models suggest some impact on the distribution of precipitation.'

G

A further risk with geo-engineering projects is that you can "overshoot Y", says Dr Dan Hunt, from the University of Bristol's School of Geophysical Sciences, who has studied the likely impacts of the sunshade and aerosol schemes on the climate. 'You may bring global temperatures back to pre-industrial levels, but the risk is that the poles will still be warmer than they should be and the tropics will be cooler than before industrialisation.' To avoid such a scenario," Hunt says, "Angel's project would have to operate at half strength; all of which reinforces his view that the best option is to avoid the need for geo-engineering altogether."

H

The main reason why geo-engineering is supported by many in the scientific community is that most researchers have little faith in the ability of politicians to agree - and then bring in — the necessary carbon cuts. Even leading conservation organisations see the value of investigating the potential of geo-engineering. According to Dr Martin Sommerkorn, climate change advisor for the World Wildlife Fund's International Arctic Programme, 'Human-induced climate change has brought humanity to a position where we shouldn't exclude thinking thoroughly about this topic and its possibilities.'

Questions 30-36

Complete the table below.

Choose **ONE WORD** from the passage for each answer. Write your answers in boxes 30-36 on your answer sheet.

Geo-Engineering Projects

Procedure	Aim
put a large number of tiny spacecraft into orbit far above Earth	to create a 30 _____ that would reduce the amount of light reaching Earth
place 31 _____ in the sea	to encourage 32 _____ to form
release aerosol sprays into the stratosphere	to create 33 _____ that would reduce the amount of light reaching Earth
fix strong 34 _____ to Greenland ice sheets	to prevent icebergs moving into the sea
plant trees in Russian Arctic that would lose their leaves in winter	to allow the 35 _____ to reflect radiation.
change the direction of 36 _____	to bring more cold water into ice-forming areas

Source: Cambridge Book 11

Diagram Labelling

Definition: -

On the IELTS reading test, you might get a question that asks you to label a diagram.

There are three kinds of diagrams you might get: a technical drawing of a machine or invention, something from the natural world or a design or plan.

Strategy

1. Check the instruction carefully for the word limit
2. Study the diagram and try to understand generally what is happening. Don't spend too much time doing this.
3. Highlight keywords or labels.
4. Identify the types of words required and try to predict the answer.
5. Scan the text and identify where the information is located.
6. Read in more detail to find the answer.
7. Check spelling.

IN-CLASS CONTENT

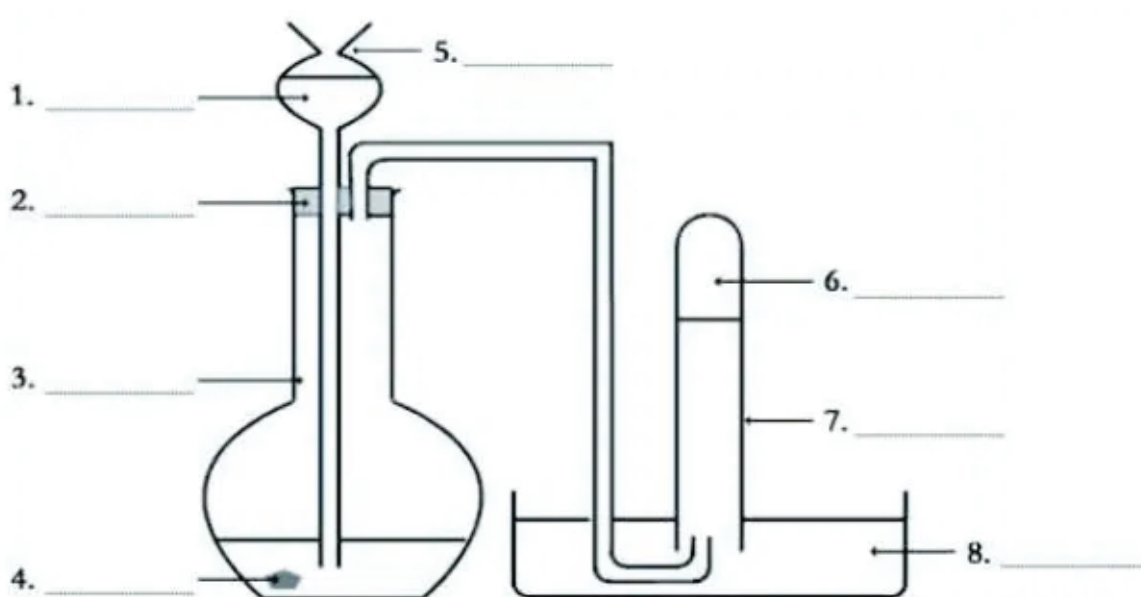
Exercise 1

Simple Chemical Experiments

Hydrogen can be made very easily by using simple laboratory equipment. All you need is a thistle funnel, cork, glass dish, graduated glass cylinder, test tube, glass pipe, zinc, tap water, and hydrochloric acid. To begin with, 5ml of tap water is put into a 50ml graduated glass cylinder with about 1gm of zinc. The top of the glass cylinder is fitted with a cork and a thistle funnel and a glass pipe inserted into it. The glass pipe connects the cylinder with a glass dish. Sufficient tap water is placed in the dish to cover the top of the pipe which is then covered with a water filled test tube. Before adding 5 ml of hydrochloric acid to the funnel it is important to make sure that the end of

the funnel is below the tap water. Once added, the hydrochloric acid comes into contact with the tap water very quickly and an immediate chemical reaction can be seen. Hydrogen gas is released and starts to travel down the pipe into the test tube. The hydrogen displaces the water and produces a test tube of pure hydrogen gas. By adding baking soda to the cylinder the acid solution is neutralized and can be poured down the sink.

Choose **NO MORE THAN THREE WORDS** from the passage for each answer.



Source: <https://www.ieltsanswers.com>, *Simple Chemical Experiments*

Practice Exercises

Practice 1

What's so funny?

John McCrone reviews recent research on humour

The joke comes over the headphones: 'Which side of a dog has the most hair? The left.' No, not funny. Try again. 'Which side of a dog has the most hair? The outside.' Hah! The punchline is silly yet fitting, tempting a smile, even a laugh. Laughter has always struck people as deeply mysterious, perhaps pointless. The

writer Arthur Koestler dubbed it the luxury reflex: 'unique in that it serves no apparent biological purpose'.

Theories about humour have an ancient pedigree. Plato expressed the idea that humour is simply a delighted feeling of superiority over others. Kant and Freud felt that joke-telling relies on building up a psychic tension which is safely punctured by the ludicrousness of the punchline. But most modern humour theorists have settled on some version of Aristotle's belief that jokes are based on a reaction to or resolution of incongruity, when the punchline is either nonsense or, though appearing silly, has a clever second meaning.

Graeme Ritchie, a computational linguist in Edinburgh, studies the linguistic structure of jokes in order to understand not only humour but language understanding and reasoning in machines. He says that while there is no single format for jokes, many revolve around sudden and surprising conceptual shifts. A comedian will present a situation followed by an unexpected interpretation that is also apt.

So even if a punchline sounds silly, the listener can see there is a clever semantic fit and that sudden mental 'Aha!' is the buzz that makes us laugh. Viewed from this angle, humour is just a form of creative insight, a sudden leap to a new perspective.

However, there is another type of laughter, the laughter of social appeasement and it is important to understand this too. Play is a crucial part of development in most young mammals. Rats produce ultrasonic squeaks to prevent their scuffles turning nasty. Chimpanzees have a 'play-face' - a gaping expression accompanied by a panting 'ah, ah' noise. In humans, these signals have mutated into smiles and laughs. Researchers believe social situations, rather than cognitive events such as jokes, trigger these instinctual markers of play or appeasement. People laugh on fairground rides or when tickled to flag a play situation, whether they feel amused or not.

Both social and cognitive types of laughter tap into the same expressive machinery in our brains, the emotion and motor circuits that produce smiles and excited vocalisations. However, if cognitive laughter is the product of more general thought processes, it should result from more expansive brain activity.

Psychologist Vinod Goel investigated humour using the new technique of 'single event' functional magnetic resonance imaging (fMRI). An MRI scanner uses magnetic fields and radio waves to track the changes in oxygenated blood that accompany mental activity. Until recently, MRI scanners needed several minutes of activity and so could not be used to track rapid thought processes such as comprehending a joke. New developments now allow half-second 'snapshots' of all sorts of reasoning and problem-solving activities.

Although Goel felt being inside a brain scanner was hardly the ideal place for appreciating a joke, he found evidence that understanding a joke involves a widespread mental shift. His scans showed that at the beginning of a joke the listener's prefrontal cortex lit up, particularly the right prefrontal believed to be critical for problem solving. But there was also activity in the temporal lobes at the side of the head (consistent with attempts to rouse stored knowledge) and in many other brain areas. Then when the punchline arrived, a new area sprang to life -the orbital prefrontal cortex. This patch of brain tucked behind the orbits of the eyes is associated with evaluating information.

Making a rapid emotional assessment of the events of the moment is an extremely demanding job for the brain, animal or human. Energy and arousal levels may need to be returned in the blink of an eye. These abrupt changes will produce either positive or negative feelings. The orbital cortex, the region that becomes active in Goel's experiment, seems the best candidate for the site that feeds such feelings into higher-level thought processes, with its close connections to the brain's sub-cortical arousal apparatus and centres of metabolic control.

All warm-blooded animals make constant tiny adjustments in arousal in response to external events, but humans, who have developed a much more complicated internal life as a result of language, respond emotionally not only to their surroundings, but to their own thoughts. Whenever a sought-for answer snaps into place, there is a shudder of pleased recognition. Creative discovery being pleasurable, humans have learned to find ways of milking this natural response. The fact that jokes tap into our general evaluative machinery explains why the line between funny and disgusting, or funny and frightening, can be so fine. Whether a joke gives pleasure or pain depends on a person's outlook.

Humour may be a luxury, but the mechanism behind it is no evolutionary accident. As Peter Derks, a psychologist at William and Mary College in Virginia, says: 'I like to think of humour as the distorted mirror of the mind. It's creative, perceptual, analytical and lingual. If we can figure out how the mind processes humour, then we'll have a pretty good handle on how it works in general

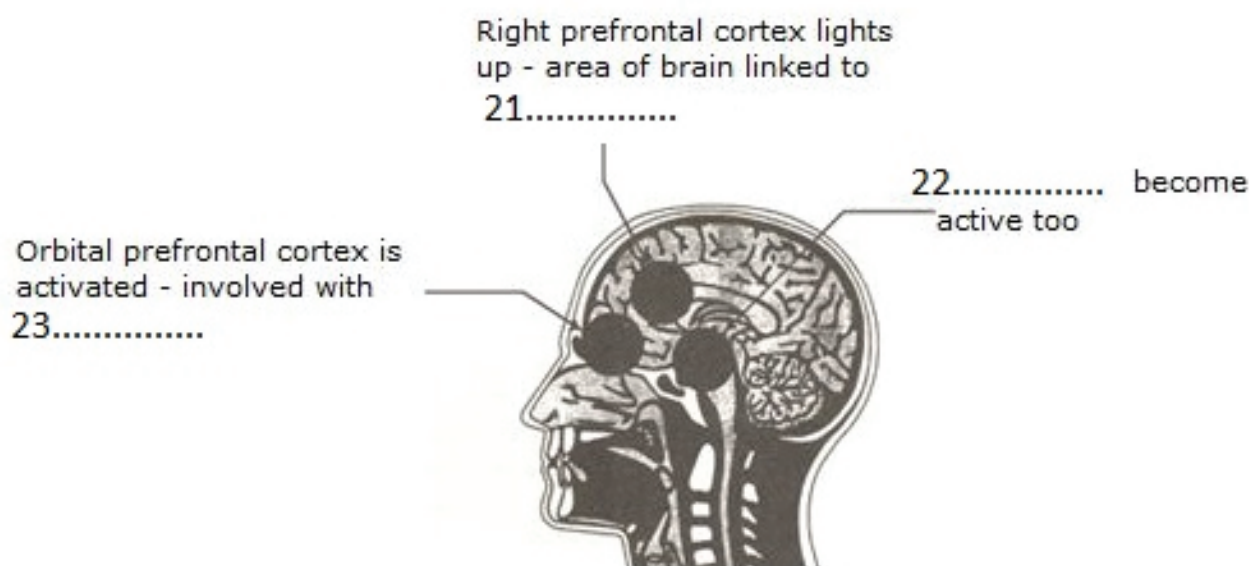
Questions 21-23

The diagram below shows the areas of the brain activated by jokes.

Label the diagram.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 21-23 on your answer sheet.



Source: Cambridge Book 5

Explanation:

21. RIGHT PREFRONTAL CORTEX LIGHTS UP – AREA OF BRAIN LINKED TO_____

Keywords: right prefrontal cortex, lights up

In paragraph 8, the writer says that “His scans showed that at the beginning of a joke the listener’s prefrontal cortex lit up, particularly the right prefrontal believed to be critical for problem solving”

+ Light up = lit up (past simple tense)

=>ANSWER: problem solving

Practice 2

A Chronicle of Timekeeping

A

According to archaeological evidence, at least 5,000 years ago, and long before the advent of the Roman Empire, the Babylonians began to measure time, introducing calendars to coordinate communal activities, to plan the shipment of goods and, in particular, to regulate planting and harvesting. They based their calendars on three natural cycles: the solar day, marked by the successive periods of light and darkness as the earth rotates on its axis; the lunar month, following the phases of the moon as it orbits the earth; and the solar year, defined by the changing seasons that accompany our planet's revolution around the sun.

B

Before the invention of artificial light, the moon had greater social impact. And, for those living near the equator in particular, its waxing and waning was more conspicuous than the passing of the seasons. Hence, the calendars that were developed at the lower latitudes were influenced more by the lunar cycle than by the solar year. In more northern climes, however, where seasonal agriculture was practised, the solar year became more crucial. As the Roman Empire expanded northward, it organised its activity chart for the most part around the solar year.

C

Centuries before the Roman Empire, the Egyptians had formulated a municipal calendar having 12 months of 30 days, with five days added to approximate the solar year. Each period of ten days was marked by the appearance of special groups of stars called decans. At the rise of the star Sirius just before sunrise, which occurred around the all-important annual flooding of the Nile, 12 decans could be seen spanning the heavens. The cosmic significance the Egyptians placed in the 12 decans led them to develop a system in which each interval of darkness (and later, each interval of daylight) was divided into a dozen equal parts. These periods became known as temporal hours because their duration varied according to the changing length of days and nights with the passing of the seasons. Summer hours were long, winter ones short; only at the spring and autumn equinoxes were the hours of daylight and darkness equal. Temporal

hours, which were first adopted by the Greeks and then the Romans, who disseminated them through Europe, remained in use for more than 2,500 years.

D

In order to track temporal hours during the day, inventors created sundials, which indicate time by the length or direction of the sun's shadow. The sundial's counterpart, the water clock, was designed to measure temporal hours at night. One of the first water clocks was a basin with a small hole near the bottom through which the water dripped out. The falling water level denoted the passing hour as it dipped below hour lines inscribed on the inner surface. Although these devices performed satisfactorily around the Mediterranean, they could not always be depended on in the cloudy and often freezing weather of northern Europe.

E

The advent of the mechanical clock meant that although it could be adjusted to maintain temporal hours, it was naturally suited to keeping equal ones. With these, however, arose the question of when to begin counting, and so, in the early 14th century, a number of systems evolved. The schemes that divided the day into 24 equal parts varied according to the start of the count: Italian hours began at sunset, Babylonian hours at sunrise, astronomical hours at midday and 'great clock' hours, used for some large public clocks in Germany, at midnight. Eventually these were superseded by 'small clock', or French, hours, which split the day into two 12-hour periods commencing at midnight.

F

The earliest recorded weight-driven mechanical clock was built in 1283 in Bedfordshire in England. The revolutionary aspect of this new timekeeper was neither the descending weight that provided its motive force nor the gear wheels (which had been around for at least 1,300 years) that transferred the power; it was the part called the escapement. In the early 1400s came the invention of the coiled spring or fusee which maintained constant force to the gear wheels of the timekeeper despite the changing tension of its mainspring. By the 16th century, a pendulum clock had been devised, but the pendulum swung in a large arc and thus was not very efficient.

G

To address this, a variation on the original escapement was invented in 1670, in England. It was called the anchor escapement, which was a lever-based device shaped like a ship's anchor. The motion of a pendulum rocks this device so that it catches and then releases each tooth of the escape wheel, in turn allowing it to turn a precise amount. Unlike the original form used in early pendulum clocks, the anchor escapement permitted the pendulum to travel in a very small arc. Moreover, this invention allowed the use of a long pendulum which could beat once a second and thus led to the development of a new floorstanding case design, which became known as the grandfather clock.

H

Today, highly accurate timekeeping instruments set the beat for most electronic devices. Nearly all computers contain a quartz-crystal clock to regulate their operation. Moreover, not only do time signals beamed down from Global Positioning System satellites calibrate the functions of precision navigation equipment, they do so as well for mobile phones, instant stock-trading systems and nationwide power-distribution grids. So integral have these time-based technologies become to day-to-day existence that our dependency on them is recognised only when they fail to work.

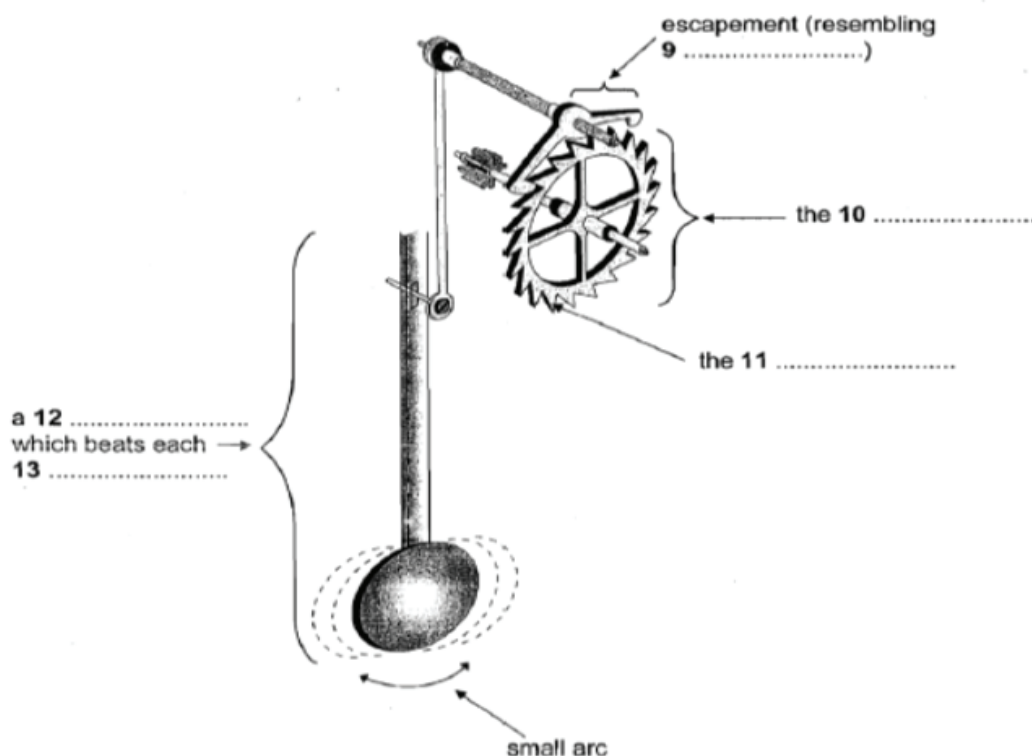
Questions 9-13

Label the diagram below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 9-13 on your answer sheet.

How the 1670 lever-based device worked



Source: Cambridge Book 8

Practice 3

Collecting Ant Specimens

Collecting ants can be as simple as picking up stray ones and placing them in a glass jar, or as complicated as completing an exhaustive survey of all species present in an area and estimating their relative abundances. The exact method used will depend on the final purpose of the collections. For taxonomy, or classification, long series, from a single nest, which contain all castes (workers, including majors and minors, and, if present, queens and males) are desirable, to allow the determination of variation within species. For ecological studies, the most important factor is collecting identifiable samples of as many of the different species present as possible. Unfortunately, these methods are not always compatible. The taxonomist sometimes overlooks whole species in favour of those groups currently under study, while the ecologist often collects only a limited number of specimens of each species, thus reducing their value for taxonomic investigations.

To collect as wide a range of species as possible, several methods must be used. These include hand collecting, using baits to attract the ants, ground litter sampling, and the use of pitfall traps. Hand collecting consists of searching for ants everywhere they are likely to occur. This includes on the ground, under rocks, logs or other objects on the ground, in rotten wood on the ground or on trees, in vegetation, on tree trunks and under bark. When possible, collections should be made from nests or foraging columns and at least 20 to 25 individuals collected. This will ensure that all individuals are of the same species, and so increase their value for detailed studies. Since some species are largely nocturnal, collecting should not be confined to daytime. Specimens are collected using an aspirator (often called a pooter), forceps, a fine, moistened paint brush, or fingers, if the ants are known not to sting. Individual insects are placed in plastic or glass tubes (1.5-3.0 ml capacity for small ants, 5-8 ml for larger ants) containing 75% to 95% ethanol. Plastic tubes with secure tops are better than glass because they are lighter, and do not break as easily if mishandled.

Baits can be used to attract and concentrate foragers. This often increases the number of individuals collected and attracts species that are otherwise elusive. Sugars and meats or oils will attract different species and a range should be utilised. These baits can be placed either on the ground or on the trunks of trees or large shrubs. When placed on the ground, baits should be situated on small paper cards or other flat, light-coloured surfaces, or in test-tubes or vials. This makes it easier to spot ants and to capture them before they can escape into the surrounding leaf litter.

Many ants are small and forage primarily in the layer of leaves and other debris on the ground. Collecting these species by hand can be difficult. One of the most successful ways to collect them is to gather the leaf litter in which they are foraging and extract the ants from it. This is most commonly done by placing leaf litter on a screen over a large funnel, often under some heat. As the leaf litter dries from above, ants (and other animals) move downward and eventually fall out the bottom and are collected in alcohol placed below the funnel. This method works especially well in rain forests and marshy areas. A method of improving the catch when using a funnel is to sift the leaf litter through a coarse screen before placing it above the

unnel. This will concentrate the litter and remove larger leaves and twigs. It will also allow more litter to be sampled when using a limited number of funnels.

The pitfall trap is another commonly used tool for collecting ants. A pitfall trap can be any small container placed in the ground with the top level with the surrounding surface and filled with a preservative. Ants are collected when they fall into the trap while foraging.

The diameter of the traps can vary from about 18 mm to 10 cm and the number used can vary from a few to several hundred. The size of the traps used is influenced largely by personal preference (although larger sizes are generally better), while the number will be determined by the study being undertaken. The preservative used is usually ethylene glycol or propylene glycol, as alcohol will evaporate quickly and the traps will dry out.

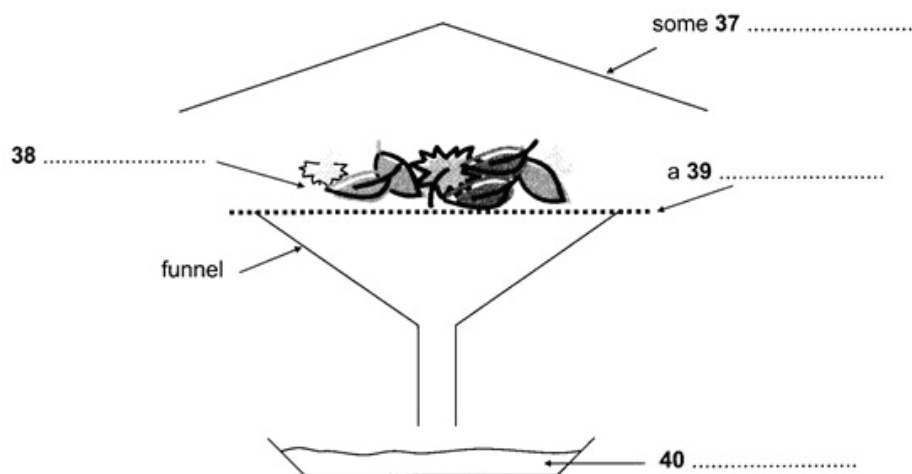
One advantage of pitfall traps is that they can be used to collect over a period of time with minimal maintenance and intervention. One disadvantage is that some species are not collected as they either avoid the traps or do not commonly encounter them while foraging.

Questions 37-40

Label the diagram below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 37-40 on your answer sheet.



Practice 4

Tidal Power

Undersea turbines which produce electricity from the tides are set to become an important source of renewable energy for Britain. It is still too early to predict the extent of the impact they may have, but all the signs are that they will play a significant role in the future

A

Operating on the same principle as wind turbines, the power in sea turbines comes from tidal currents which turn blades similar to ships' propellers, but, unlike wind, the tides are predictable and the power input is constant. The technology raises the prospect of Britain becoming self-sufficient in renewable energy and drastically reducing its carbon dioxide emissions. If tide, wind and wave power are all developed, Britain would be able to close gas, coal and nuclear power plants and export renewable power to other parts of Europe. Unlike wind power, which Britain originally developed and then abandoned for 20 years allowing the Dutch to make it a major industry, undersea turbines could become a big export earner to island nations such as Japan and New Zealand.

B

Tidal sites have already been identified that will produce one sixth or more of the UK's power - and at prices competitive with modern gas turbines and undercutting those of the already ailing nuclear industry. One site alone, the Pentland Firth, between Orkney and mainland Scotland, could produce 10% of the country's electricity with banks of turbines under the sea, and another at Alderney in the Channel Islands three times the 1,200 megawatts of Britain's largest and newest nuclear plant, Sizewell B, in Suffolk. Other sites identified include the Bristol Channel and the west coast of Scotland, particularly the channel between Campbeltown and Northern Ireland.

C

Work on designs for the new turbine blades and sites are well advanced at the University of Southampton's sustainable energy research group. The first station is expected to be installed off Lynmouth in Devon shortly to test the technology

a venture jointly funded by the department of Trade and Industry and the European Union. AbuBakr Bahaj, in charge of the Southampton research, said: The prospects for energy from tidal currents are far better than from wind because the flows of water are predictable and constant. The technology for dealing with the hostile saline environment under the sea has been developed in the North Sea oil industry and much is already known about turbine blade design, because of wind power and ship propellers. There are a few technical difficulties, but I believe in the next five to ten years we will be installing commercial marine turbine farms.' Southampton has been awarded £215,000 over three years to develop the turbines and is working with Marine Current Turbines, a subsidiary of IT power, on the Lynmouth project. EU research has now identified 106 potential sites for tidal power, 80% round the coasts of Britain. The best sites are between islands or around heavily indented coasts where there are strong tidal currents.

D

A marine turbine blade needs to be only one third of the size of a wind generator to produce three times as much power. The blades will be about 20 metres in diameter, so around 30 metres of water is required. Unlike wind power, there are unlikely to be environmental objections. Fish and other creatures are thought unlikely to be at risk from the relatively slow-turning blades. Each turbine will be mounted on a tower which will connect to the national power supply grid via underwater cables. The towers will stick out of the water and be lit, to warn shipping, and also be designed to be lifted out of the water for maintenance and to clean seaweed from the blades.

E

Dr Bahaj has done most work on the Alderney site, where there are powerful currents. The single undersea turbine farm would produce far more power than needed for the Channel Islands and most would be fed into the French Grid and be re-imported into Britain via the cable under the Channel.

F

One technical difficulty is cavitation, where low pressure behind a turning blade causes air bubbles. These can cause vibration and damage the blades of the turbines. Dr Bahaj said: 'We have to test a number of blade types to avoid this

appening or at least make sure it does not damage the turbines or reduce performance. Another slight concern is submerged debris floating into the blades. So far we do not know how much of a problem it might be. We will have to make the turbines robust because the sea is a hostile environment, but all the signs that we can do it are good.'

Questions 10-13

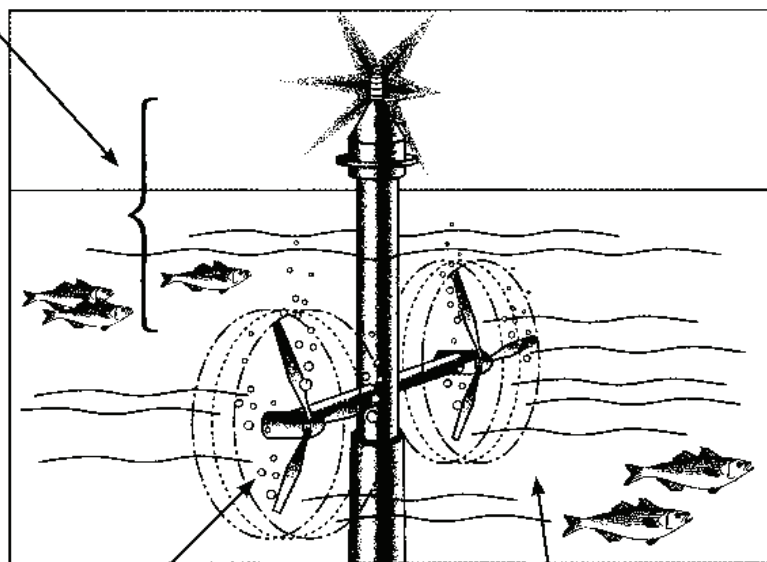
Label the diagram below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 10-13 on your answer sheet.

An Undersea Turbine

Whole tower can be raised
for **10** and the extraction
of seaweed from the blades



Air bubbles result from
the **12** behind blades.
This is known as **13**

Sea life not in danger due to the
fact that blades are comparatively
11

Source: Cambridge Book 9

Practice 5

The Falkirk Wheel

A unique engineering achievement

The Falkirk Wheel in Scotland is the world's first and only rotating boat lift. Opened in 2002, it is central to the ambitious £84.5m Millennium Link project to restore navigability across Scotland by reconnecting the historic waterways of the Forth & Clyde and Union Canals.

The major challenge of the project lies in the fact that the Forth & Clyde Canal is situated 35 metres below the level of the Union Canal. Historically, the two canals had been joined near the town of Falkirk by a sequence of 11 locks - enclosed sections of canal in which the water level could be raised or lowered - that stepped down across a distance of 1.5 km. This had been dismantled in 1933, thereby breaking the link. When the project was launched in 1994, the British Waterways authority were keen to create a dramatic twenty-first-century landmark which would not only be a fitting commemoration of the Millennium, but also a lasting symbol of the economic regeneration of the region.

Numerous ideas were submitted for the project, including concepts ranging from rolling eggs to tilting tanks, from giant seesaws to overhead monorails. The eventual winner was a plan for the huge rotating steel boat lift which was to become The Falkirk Wheel. The unique shape of the structure is claimed to have been inspired by various sources, both manmade and natural, most notably a Celtic double headed axe, but also the vast turning propeller of a ship, the ribcage of a whale or the spine of a fish.

The various parts of The Falkirk Wheel were all constructed and assembled, like one giant toy building set, at Butterley Engineering's Steelworks in Derbyshire, some 400 km from Falkirk. A team there carefully assembled the 1,200 tonnes of steel, painstakingly fitting the pieces together to an accuracy of just 10 mm to ensure a perfect final fit. In the summer of 2001, the structure was then dismantled and transported on 35 lorries to Falkirk, before all being bolted back together again on the ground, and finally lifted into position in five large sections by crane. The Wheel would need to withstand immense and constantly changing stresses as it rotated, so to make the structure more robust, the steel

sections were bolted rather than welded together. Over 45,000 bolt holes were matched with their bolts, and each bolt was hand-tightened.

The Wheel consists of two sets of opposing axe-shaped arms, attached about 25 metres apart to a fixed central spine.

Two diametrically opposed water-filled 'gondolas', each with a capacity of 360,000 litres, are fitted between the ends of the arms. These gondolas always weigh the same, whether or not they are carrying boats. This is because, according to Archimedes' principle of displacement, floating objects displace their own weight in water. So when a boat enters a gondola, the amount of water leaving the gondola weighs exactly the same as the boat. This keeps the Wheel balanced and so, despite its enormous mass, it rotates through 180° in five and a half minutes while using very little power. It takes just 1.5 kilowatt-hours (5.4 MJ) of energy to rotate the Wheel -roughly the same as boiling eight small domestic kettles of water.

Boats needing to be lifted up enter the canal basin at the level of the Forth & Clyde Canal and then enter the lower gondola of the Wheel. Two hydraulic steel gates are raised, so as to seal the gondola off from the water in the canal basin. The water between the gates is then pumped out. A hydraulic clamp, which prevents the arms of the Wheel moving while the gondola is docked, is removed, allowing the Wheel to turn. In the central machine room an array of ten hydraulic motors then begins to rotate the central axle. The axle connects to the outer arms of the Wheel, which begin to rotate at a speed of 1/8 of a revolution per minute. As the wheel rotates, the gondolas are kept in the upright position by a simple gearing system. Two eight-metre-wide cogs orbit a fixed inner cog of the same width, connected by two smaller cogs travelling in the opposite direction to the outer cogs - so ensuring that the gondolas always remain level. When the gondola reaches the top, the boat passes straight onto the aqueduct situated 24 metres above the canal basin.

The remaining 11 metres of lift needed to reach the Union Canal is achieved by means of a pair of locks. The Wheel could not be constructed to elevate boats over the full 35-metre difference between the two canals, owing to the presence of the historically important Antonine Wall, which was built by the Romans in the second century AD. Boats travel under this wall via a tunnel, then through the locks, and finally on to the Union Canal.

Questions 7-13

Label the diagram below.

Choose **ONE WORD** from the passage for each answer.

Write your answers in boxes 7-13 on your answer sheet.

How a boat is lifted on the Falkirk Wheel

A pair of **7** are lifted in order to shut out water from canal basin

A **8** is taken out, enabling Wheel to rotate

13 raise boat 11 m to level of Union Canal

Hydraulic motors drive **9**

Boat travels through tunnel beneath Roman **12**

Boat is raised, floating in one of Wheel's two gondolas

Boat reaches top Wheel, then moves directly onto **11**

A range of different-sized **10** ensures boat keeps upright

Source: Cambridge Book 11

Practice 6

Raising the Mary Rose

How a sixteenth-century warship was recovered from the seabed

On 19 July 1545, English and French fleets were engaged in a sea battle off the coast of southern England in the area of water called the Solent, between

Portsmouth and the Isle of Wight. Among the English vessels was a warship by the name of Mary Rose. Built in Portsmouth some 35 years earlier, she had had a long and successful fighting career, and was a favourite of King Henry VIII. Accounts of what happened to the ship vary: while witnesses agree that she was not hit by the French, some maintain that she was outdated, overladen and sailing too low in the water, others that she was mishandled by undisciplined crew. What is undisputed, however, is that the Mary Rose sank into the Solent that day, taking at least 500 men with her. After the battle, attempts were made to recover the ship, but these failed.

The Mary Rose came to rest on the seabed, lying on her starboard (right) side at an angle of approximately 60 degrees. The hull (the body of the ship) acted as a trap for the sand and mud carried by Solent currents. As a result, the starboard side filled rapidly, leaving the exposed port (left) side to be eroded by marine organisms and mechanical degradation. Because of the way the ship sank, nearly all of the starboard half survived intact. During the seventeenth and eighteenth centuries, the entire site became covered with a layer of hard grey clay, which minimised further erosion.

Then, on 16 June 1836, some fishermen in the Solent found that their equipment was caught on an underwater obstruction, which turned out to be the Mary Rose. Diver John Deane happened to be exploring another sunken ship nearby, and the fishermen approached him, asking him to free their gear. Deane dived down, and found the equipment caught on a timber protruding slightly from the seabed. Exploring further, he uncovered several other timbers and a bronze gun. Deane continued diving on the site intermittently until 1840, recovering several more guns, two bows, various timbers, part of a pump and various other small finds.

The Mary Rose then faded into obscurity for another hundred years. But in 1965, military historian and amateur diver Alexander McKee, in conjunction with the British Sub-Aqua Club, initiated a project called 'Solent Ships'. While on paper this was a plan to examine a number of known wrecks in the Solent, what McKee really hoped for was to find the Mary Rose. Ordinary search techniques proved unsatisfactory, so McKee entered into collaboration with Harold E. Edgerton, professor of electrical engineering at the Massachusetts Institute of Technology.

In 1967, Edgerton's side-scan sonar systems revealed a large, unusually shaped object, which McKee believed was the Mary Rose.

Further excavations revealed stray pieces of timber and an iron gun. But the climax to the operation came when, on 5 May 1971, part of the ship's frame was uncovered. McKee and his team now knew for certain that they had found the wreck, but were as yet unaware that it also housed a treasure trove of beautifully preserved artefacts. Interest in the project grew, and in 1979, The Mary Rose Trust was formed, with Prince Charles as its President and Dr .Margaret Rule its Archaeological Director. The decision whether or not to salvage the wreck was not an easy one, although an excavation in 1978 had shown that it might be possible to raise the hull. While the original aim was to raise the hull if at all feasible, the operation was not given the go-ahead until January 1982, when all the necessary information was available.

An important factor in trying to salvage the Mary Rose was that the remaining hull was an open shell. This led to an important decision being taken: namely to carry out the lifting operation in three very distinct stages. The hull was attached to a lifting frame via a network of bolts and lifting wires. The problem of the hull being sucked back downwards into the mud was overcome by using 12 hydraulic jacks. These raised it a few centimetres over a period of several days, as the lifting frame rose slowly up its four legs. It was only when the hull was hanging freely from the lifting frame, clear of the seabed and the suction effect of the surrounding mud, that the salvage operation progressed to the second stage. In this stage, the lifting frame was fixed to a hook attached to a crane, and the hull was lifted completely clear of the seabed and transferred underwater into the lifting cradle. This required precise positioning to locate the legs into the 'stabbing guides' of the lifting cradle. The lifting cradle was designed to fit the hull using archaeological survey drawings, and was fitted with air bags to provide additional cushioning for the hull's delicate timber framework. The third and final stage was to lift the entire structure into the air, by which time the hull was also supported from below. Finally, on 11 October 1982, millions of people around the world held their breath as the timber skeleton of the Mary Rose was lifted clear of the water, ready to be returned home to Portsmouth.

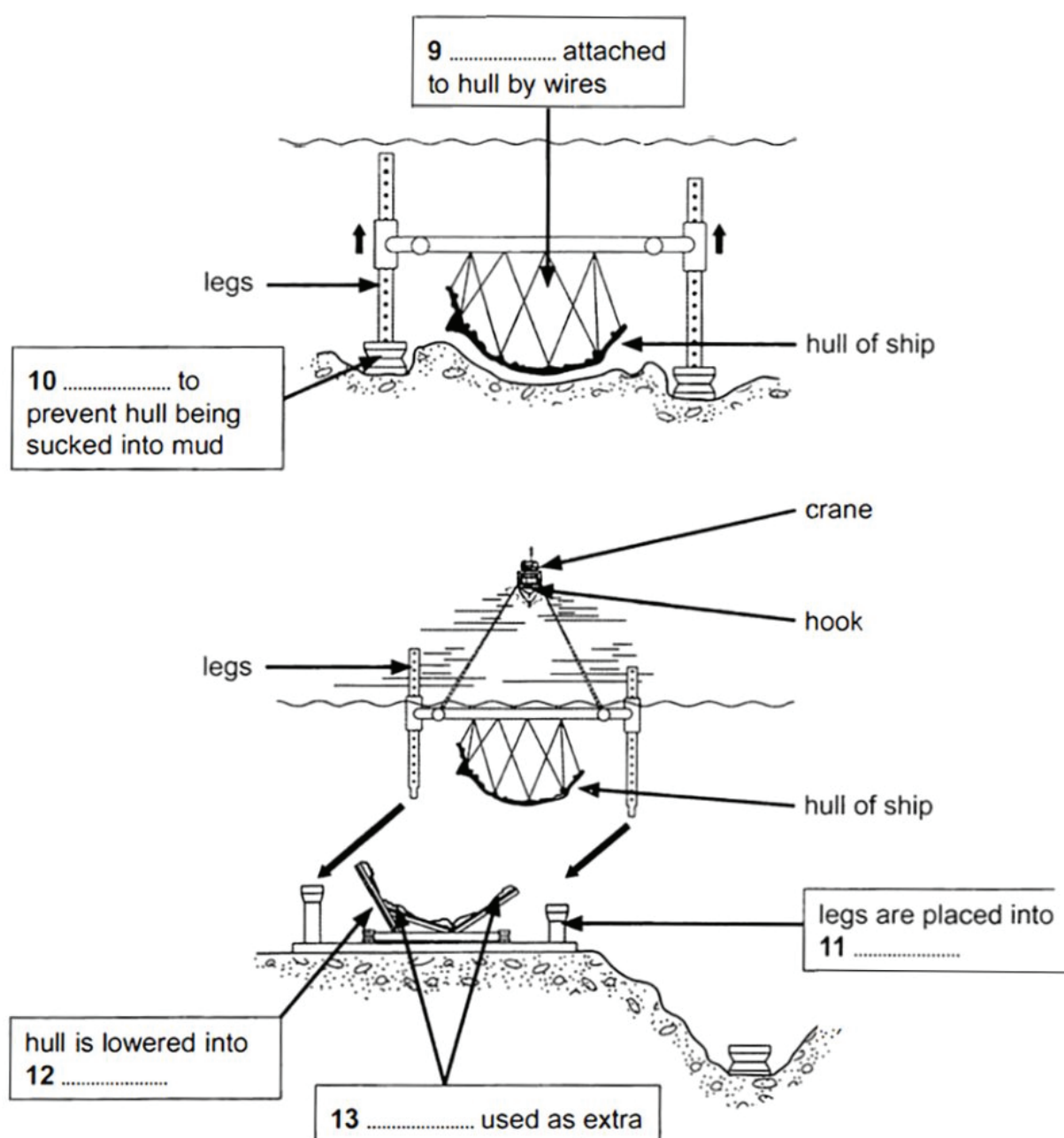
Questions 9-13

Label the diagram below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 9-13 on your answer sheet.

Raising the hull of the Mary Rose: Stages one and two



Source: Cambridge Book 11

Practice 7

ELEPHANT COMMUNICATION

O' Connell-Rodwell, a postdoctoral fellow at Stanford University, has travelled to Namibia's first-ever wildlife reserve to explore the mystical and complicated realm of elephant communication. She, along with her colleagues, is part of a scientific revolution that started almost 20 years ago. This revolution has made a stunning revelation: elephants are capable of communicating with each other over long distances with low-frequency sounds, also known as infrasounds, which are too deep for humans to hear.

As might be expected, African elephants able to detect seismic sound may have something to do with their ears. The hammer bone in an elephant's inner ear is proportionally huge for a mammal, but it is rather normal for animals that use vibrational signals. Thus, it may be a sign that suggests elephants can use seismic sounds to communicate.

Other aspects of elephant anatomy also support that ability. First, their massive bodies, which enable them to give out low-frequency sounds almost as powerful as the sound a jet makes during takeoff, serve as ideal frames for receiving ground vibrations and transmitting them to the inner ear. Second, the elephant's toe bones are set on a fatty pad, which might be of help when focusing vibrations from the ground into the bone. Finally, the elephant has an enormous brain that sits in the cranial cavity behind the eyes in line with the auditory canal. The front of the skull is riddled with sinus cavities, which might function as resonating chambers for ground vibrations.

It remains unclear how the elephants detect such vibrations, but O' Connell-Rodwell raises a point that the pachyderms are 'listening' with their trunks and feet instead of their ears. The elephant trunk may just be the most versatile appendage in nature. Its utilization encompasses drinking, bathing, smelling, feeding and scratching. Both trunk and feet contain two types of nerve endings that are sensitive to pressure – one detects infrasonic vibration, and another responds to vibrations higher in frequencies. As O' Connell-Rodwell sees, this research has a boundless and unpredictable future. 'Our work is really interfaced with geophysics, neurophysiology and ecology,' she says. 'We're raising questions that have never even been considered before.'

It has been well-known to scientists that seismic communication is widely observed among small animals, such as spiders, scorpions, insects and quite a lot of vertebrate species like white-lipped frogs, blind mole rats, kangaroo rats and golden moles. Nevertheless, O'Connell-Rodwell first argued that a giant land animal is also sending and receiving seismic signals. 'I used to lay a male planthopper on a stem and replay the calling sound of a female, and then the male one would exhibit the same kind of behaviour that happens in elephants—he would freeze, then press down on his legs, move forward a little, then stay still again. I find it so fascinating, and it got me thinking that perhaps auditory communication is not the only thing that is going on.'

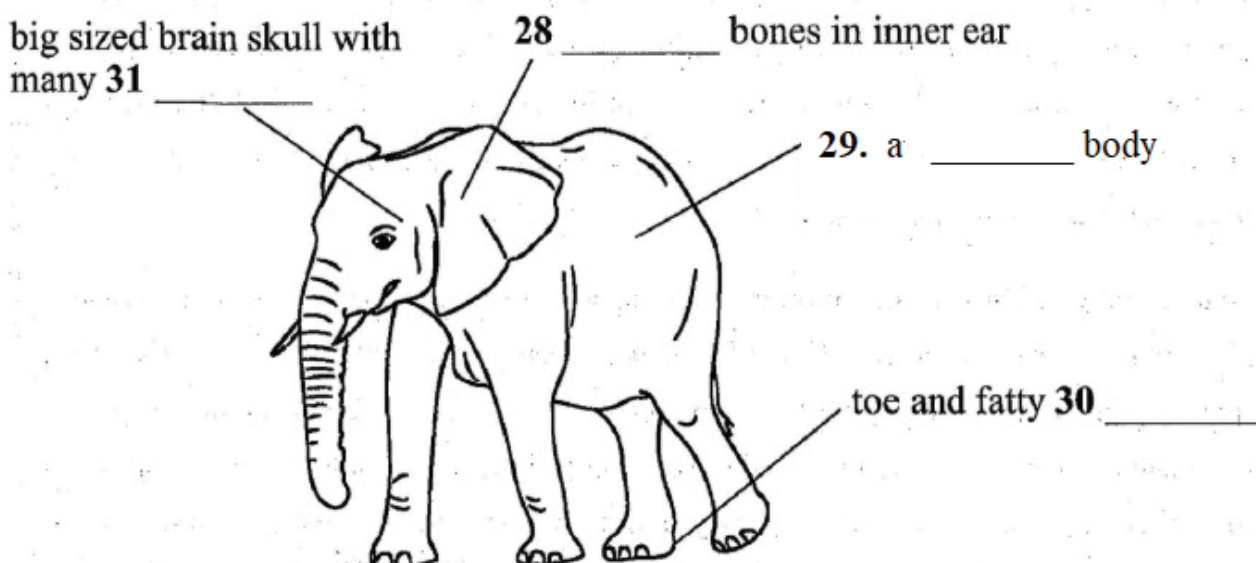
Scientists have confirmed that an elephant's capacity to communicate over long distances is essential for survival, especially in places like Etosha, where more than 2,400 savanna elephants range over a land bigger than New Jersey. It is already difficult for an elephant to find a mate in such a vast wild land, and the elephant reproductive biology only complicates it. Breeding herds also adopt low-frequency sounds to send alerts regarding predators. Even though grown-up elephants have no enemies other than human beings, baby elephants are vulnerable and are susceptible to lion and hyenas attack. At the sight of a predator, older ones in the herd will clump together to form protection before running away.

We now know that elephants can respond to warning calls in the air, but can they detect signals transmitted solely through the ground? To look into that matter, the research team designed an experiment in 2002, which used electronic devices that enabled them to give out signals through the ground at Mushara. 'The outcomes of our 2002 study revealed that elephants could indeed sense warning signals through the ground,' O'Connell-Rodwell observes.

Label the diagram below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 28-31 on your answer sheet.



Source: <https://frontlineielts.com/>, *ELEPHANT COMMUNICATION*

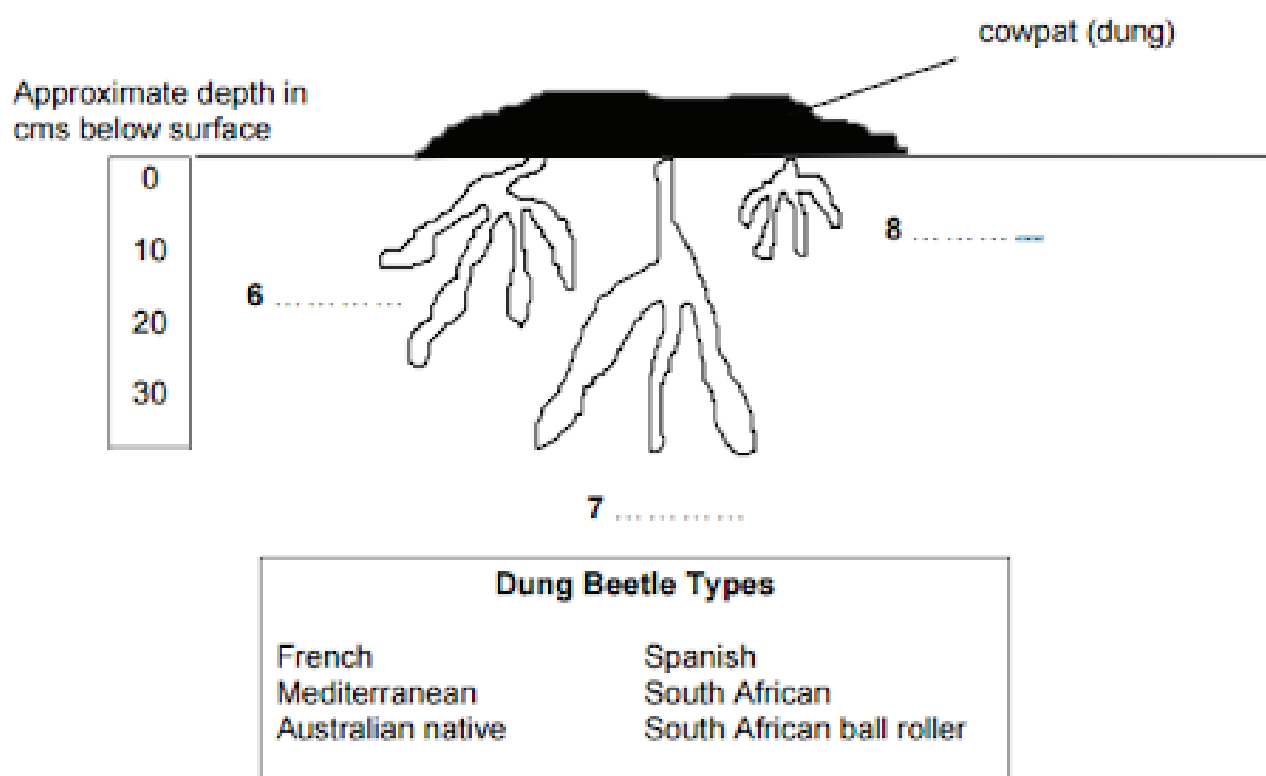
Practice 8

DUNG BEETLES

Introducing dung beetles into a pasture is a simple process: approximately 1,500 beetles are released, a handful at a time, into fresh cow pats² in the cow pasture. The beetles immediately disappear beneath the pats digging and tunnelling and, if they successfully adapt to their new environment, soon become a permanent, self-sustaining part of the local ecology. In time they multiply and within three or four years the benefits to the pasture are obvious. Dung beetles work from the inside of the pat so they are sheltered from predators such as birds and foxes. Most species burrow into the soil and bury dung in tunnels directly underneath the pats, which are hollowed out from within. Some large species originating from France excavate tunnels to a depth of approximately 30 cm below the dung pat. These beetles make sausage-shaped brood chambers along the tunnels. The shallowest tunnels belong to a much smaller Spanish species that buries dung in chambers that hang like fruit from the branches of a pear tree. South African beetles dig narrow tunnels of approximately 20 cm below the surface of the pat. Some surface-dwelling beetles, including a South African species, cut perfectly-shaped balls from the pat, which are rolled away

and attached to the bases of plants. For maximum dung burial in spring, summer and autumn, farmers require a variety of species with overlapping periods of activity. In the cooler environments of the state of Victoria, the large French species (2.5 cms long), is matched with smaller (half this size), temperate-climate Spanish species. The former are slow to recover from the winter cold and produce only one or two generations of offspring from late spring until autumn. The latter, which multiply rapidly in early spring, produce two to five generations annually. The South African ball-rolling species, being a sub-tropical beetle, prefers the climate of northern and coastal New South Wales where it commonly works with the South African tunneling species. In warmer climates, many species are active for longer periods of the year.

Questions 6 – 8 Label the tunnels on the diagram below using words from the box. Write your answers in boxes 6-8 on your answer sheet.



Source: <https://www.ielts.org>, *DUNG BEETLE*

Practice 9

The Brooklyn Bridge

Looming majestically over New York City's East River, the Brooklyn Bridge is one of the most remarkable engineering feats of the nineteenth century. At its opening ceremony, it was proclaimed the eighth wonder of the world because of its two stately towers and unprecedented length. Suspension bridges are generally measured by the length of their main span, which is the distance between their two supporting towers. The Brooklyn Bridge is dwarfed by modern suspension bridges, the longest of which is 1,991 metres, but at the time of its construction, it was the longest suspension bridge in the world at 480 metres. That was substantially longer than the previous record holder, which was 322 metres in length.

Prior to its completion in 1883, commuters had only been able to travel between the then-separate cities of Brooklyn and New York by ferry. A range of proposals for a bridge spanning the East River were put forward as early as 1800, but none were accepted by city officials due to the technical difficulty or prohibitive cost involved. It was not until 1867 that permission to build the Brooklyn Bridge as we know it today was finally granted by New York legislators. The designer of the Brooklyn Bridge, German-born immigrant John A. Roebling, was a pioneer in the design of steel suspension bridges, having previously designed and built others including the John A. Roebling Suspension Bridge. Opened in 1866, this bridge is still standing today and crosses the Ohio River between Cincinnati, Ohio and Covington, Kentucky. Unfortunately, John A. Roebling did not live to see the completion of his bridge. While conducting final surveys of the site of the Brooklyn tower in June 1869, he sustained an injury when an incoming ferry crushed his foot against the dock. The injury itself was not life-threatening, but apart from allowing a surgeon to amputate his injured toes, he refused medical treatment, opting to treat his wound himself. His condition deteriorated when he contracted tetanus, which claimed his life three weeks later. His 32-year-old son, Washington A. Roebling, also a trained engineer, took over his father's role. Construction of the Brooklyn Bridge began in January 1870. In order to dig

solid foundations for the bridge's stone towers, massive wooden boxes with no bottoms called caissons were used. The caissons allowed workers to dig away at the sand and rock on the riverbed without being flooded by the river water. The stone towers were built on top of the caissons, which sank deeper into the riverbed as the workers dug. Water was kept out of the work chamber at the base of the caisson where the workers dug by means of compressed air, which was pumped in through a special duct in the roof of the caisson. Workers entered via a series of ladders, passing through an air lock on the way down. This had a door on each side, only one of which could be opened at any one time. Had both doors been opened, compressed air would have escaped, with dire consequences for the workers. The sand, rock and boulders that workers excavated were hoisted out of the caisson in huge buckets via a debris shaft. This was filled with water in order to maintain the correct air pressure. When the caissons had reached the desired depth, concrete was pumped into them until they formed solid blocks. These then become part of the permanent foundations.

Caisson work was extremely difficult, and the men who worked in the caissons took great risks. Not only was flooding a possibility, but fire was also a very real threat. In 1870, the timber roof of the Brooklyn caisson caught fire from a worker's candle. This fire, nicknamed the "Great Blowout", delayed construction for several months because repairs had to be carried out. The Manhattan caisson, which was built after the Brooklyn one, was lined with plate iron to ensure that it would not become engulfed in flames like its counterpart had. Many of the workers were also struck down by a mysterious ailment. Poorly understood at the time, the bends killed at least three workers, and caused joint pain, speech impediments and paralysis in many others. The high toll that the caisson work was taking on workers ultimately led Washington A. Roebling to halt construction, but that was not before Roebling himself had succumbed to the illness. His condition left him unable to supervise the project in person. He was forced to remain in his home, but his wife Emily, also a trained engineer, relayed his instructions to site workers, and eventually took over day-to-day supervision and project management.

Once the caissons were completed, the masonry towers continued to be built on top, a complex process that took four years. The weight of the blocks meant

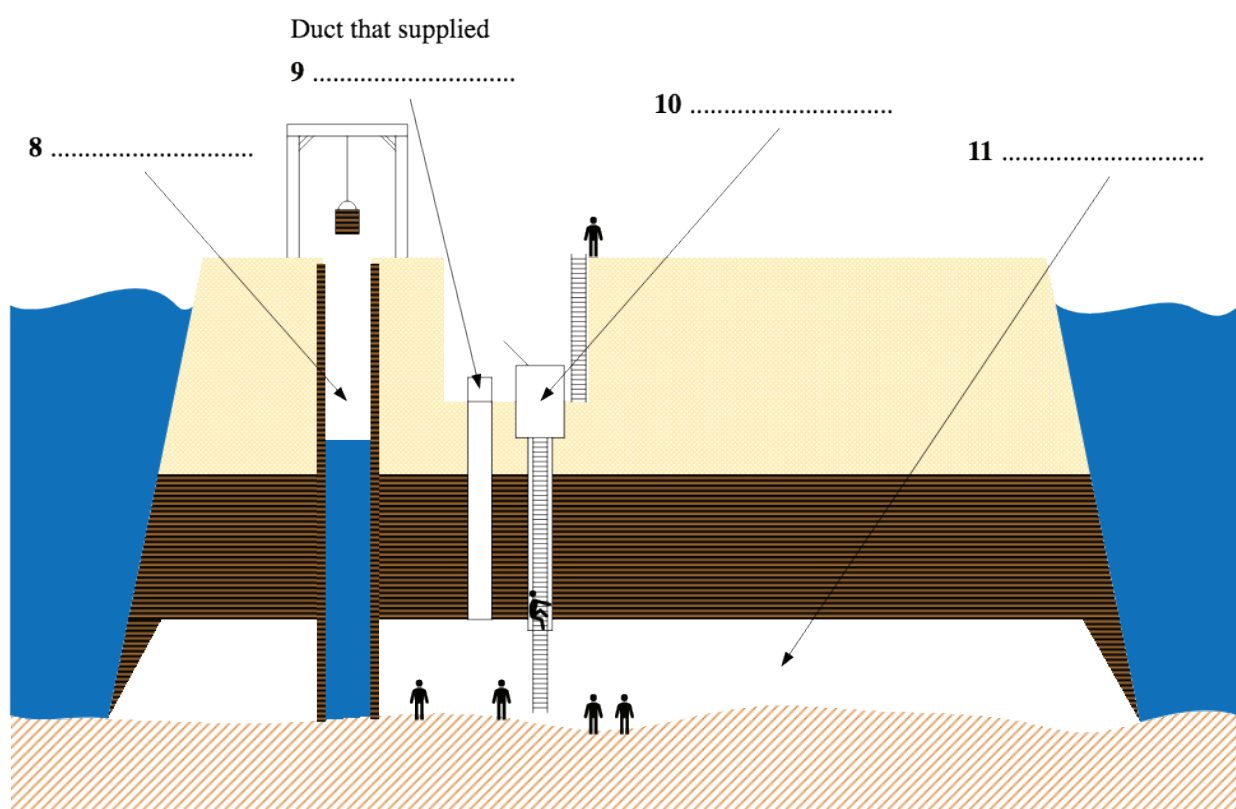
at a pulley system had to be used to transport them to the base of each tower. They were then carried up a timber track and manoeuvred into position with the help of a derrick. The next stage was cabling. Work began on the four enormous cables that would support the roadway in 1877. Work was well underway when it was discovered that the cable manufacturer had been selling them faulty wires. This could have caused the bridge to collapse had it not been for the over-engineering in John A. Roebling's design. It was too late to replace the cables, but they were able to reinforce them with additional wires, and the roadway was then suspended from the cables

Questions 8–11

Label the diagram below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Write your answers in boxes 8–11 on your answer sheet.



Source: <https://www.academicenglishco.com/>, *The Brooklyn Bridge*

Practice 10

GLASS - Capturing the dance of light

A Glass, in one form or another, has long been in noble service to humans. As one of the most widely used of manufactured materials, and certainly the most versatile, it can be as imposing as a telescope mirror the width of a tennis court or as small and simple as a marble rolling across dirt. The uses of this adaptable material have been broadened dramatically by new technologies glass fibre optics — more than eight million miles — carrying telephone and television signals across nations, glass ceramics serving as the nose cones of missiles and as crowns for teeth; tiny glass beads taking radiation doses inside the body to specific organs, even a new type of glass fashioned of nuclear waste in order to dispose of that unwanted material.

B On the horizon are optical computers. These could store programs and process information by means of light - pulses from tiny lasers - rather than electrons. And the pulses would travel over glass fibres, not copper wire. These machines could function hundreds of times faster than today's electronic computers and hold vastly more information. Today fibre optics are used to obtain a clearer image of smaller and smaller objects than ever before - even bacterial viruses. A new generation of optical instruments is emerging that can provide detailed imaging of the inner workings of cells. It is the surge in fibre optic use and in liquid crystal displays that has set the U.S. glass industry (a 16 billion dollar business employing some 150,000 workers) to building new plants to meet demand.

C But it is not only in technology and commerce that glass has widened its horizons. The use of glass as art, a tradition spins back at least to Roman times, is also booming. Nearly everywhere, it seems, men and women are blowing glass and creating works of art. «I didn't sell a piece of glass until 1975,» Dale Chihuly said, smiling, for in the 18 years since the end of the dry spell, he has become one of the most financially successful artists of the 20th century. He now has a new commission - a glass sculpture for the headquarters building of a pizza company - for which his fee is half a million dollars.

D But not all the glass technology that touches our lives is ultra-modern. Consider the simple light bulb; at the turn of the century most light bulbs were hand blown, and the cost of one was equivalent to half a day's pay for the average worker. In effect, the invention of the ribbon machine by Corning in the 1920s lighted a nation. The price of a bulb plunged. Small wonder that the machine has been called one of the great mechanical achievements of all time. Yet it is very simple: a narrow ribbon of molten glass travels over a moving belt of steel in which there are holes. The glass sags through the holes and into waiting moulds. Puffs of compressed air then shape the glass. In this way, the envelope of a light bulb is made by a single machine at the rate of 66,000 an hour, as compared with 1,200 a day produced by a team of four glassblowers.

E The secret of the versatility of glass lies in its interior structure. Although it is rigid, and thus like a solid, the atoms are arranged in a random disordered fashion, characteristic of a liquid. In the melting process, the atoms in the raw materials are disturbed from their normal position in the molecular structure; before they can find their way back to crystalline arrangements the glass cools. This looseness in molecular structure gives the material what engineers call tremendous "formability" which allows technicians to tailor glass to whatever they need.

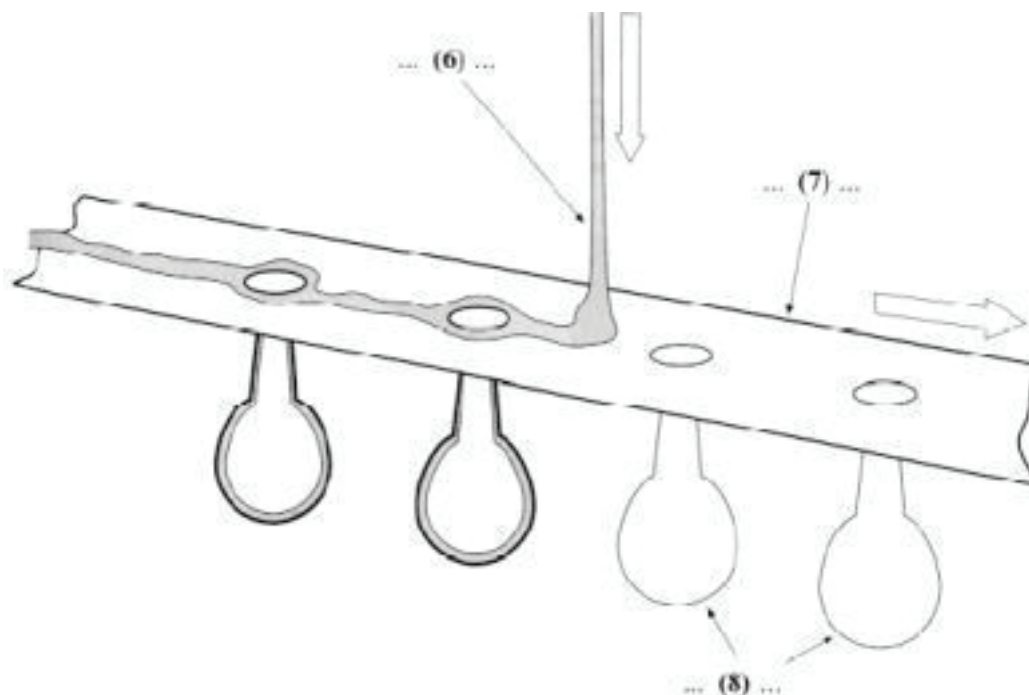
F Today, scientists continue to experiment with new glass mixtures and building designers test their imaginations with applications of special types of glass. A London architect, Mike Davies, sees even more dramatic buildings using molecular chemistry. "Glass is the great building material of the future, the «dynamic skin», he said. "Think of glass that has been treated to react to electric currents going through it, glass that will change from clear to opaque at the push of a button, that gives you instant curtains. Think of how the tall buildings in New York could perform a symphony of colours as the glass in them is made to change colours instantly." Glass as instant curtains is available now, but the cost is exorbitant. As for the glass changing colours instantly, that may come true. Mike Davies's vision may indeed be on the way to fulfilment.

Questions 6-8

The diagram below shows the principle of Coming's ribbon machine.

Label the diagram by selecting **NO MORE THAN THREE WORDS** from the Reading Passage to fill each numbered space.

Write your answers in boxes 6-8 on your answer sheet.



Source: <https://ieltsmaterial.com/>, *GLASS - Capturing the dance of light*

Matching Heading

Introduction:

One type of question that test takers often find tricky in the IELTS test is matching headings in the Reading test.

This question type requires you to match the heading in the question to the correct paragraph or reading section in the text. There will always be more headings than paragraphs or sections so that some headings will not be used. It is also possible that some of the text may not be included in the task. This task type is used with texts that contain paragraphs that have clearly defined themes. It tests your ability to recognise the main idea of the paragraph.

The question type can be tricky because of the following reasons:

1. It consumes more time than other questions to complete.
2. Often, there are more headings than paragraphs.
3. Some paragraphs don't need headings.
4. There are some similarities between headings.
5. Headings that only include specific details rather than the main idea may mislead you.
6. Some headings have the same words that are in a paragraph but don't match.

Strategies

1. First, read each heading

Read the list of headings.

2. Circle keywords within the headings

Underline or circle keywords in each heading such as names, places, dates, and nouns, once you have read them fully. Connecting the correct heading to the appropriate paragraph may become easier with this step.

3. Any similarities or differences between the headings should be noted

In this type of question, headings are often very similar or completely opposite. Similarities and differences will become clearer among the headings, once you have picked out keywords. This will make choosing an option clearer.

4. Read the first and last sentence of the paragraph

The first and/or last sentence of a paragraph often contains the main idea. It is good practice to read these sentences carefully as it will save time. It is also important to skim the other sentences quickly within the paragraph.

5. The heading that is most suitable for the paragraph should be chosen

Choose the heading that most closely matches the main idea of the paragraph. Make a note if you are unsure of the difference between multiple headings, and move on. You may be able to cross some heading options out and answers may become clearer once you've solved the rest of the paragraphs. Remember, a

heading is the **main idea** of the paragraph, **NOT a specific detail**. The same detail in the paragraph such as a matching word may be in the heading, but it may not be the main idea. This can be confusing to test takers.

Tips:

1. Do not read everything in the paragraph.
2. Make sure you are not tricked by the extra headings.
3. Try to find the topic sentence/main idea of each paragraph (mostly reading the first and the last sentence helps)
4. Read the passage in sequence
5. Expect to read paraphrased information.

Key Skills Required:

1. **Skimming-** is reading rapidly in order to get a general overview of the material.
2. **Deducing-** Reading a text and working out the meaning from the surrounding context and information given.
3. **Surveying-** It is a broad look at a text, focusing on the general aspects rather than details, with the main purpose being to decide on the value of the text, to determine which paragraphs are worth reading more closely.

IN-CLASS CONTENT

Exercise 1

List of Headings

- i Effect of city life on mental health
- ii Stress reduction in animals
- iii Two types of stress
- iv The fallout of cell death

- v The best type of exercise
- vi How stress can be useful
- vii Managing stress in job interviews
- viii One reason behind bad tempers
- ix Neuron loss in childhood
- x Regrowing the brain with exercise

A

Despite its bad reputation, stress historically had a vital role to play. Commonly referred to as the ‘fight or flight’ mode, the sudden release of stress hormones like adrenaline and cortisol causes the heart to beat faster, airways to dilate and blood vessels to open up, all of which push the body towards optimal performance and, ultimately, survival. In the rest of the animal kingdom, this is still often the difference between life and death. As he springs off to freedom, the lucky gazelle who escapes the lion can thank this primal evolutionary response.

B

In ordinary modern life, although we’re in little danger of being stalked by wild beasts down city streets, our bodies react to stress in the same ways. Experiencing anxiety, fear and stress is considered a normal part of life when it is occasional and temporary, such as feeling anxious and stressed before an exam or a job interview. It is when these acute reactions are prolonged or cannot be switched off, however, that serious physical, social and cognitive issues can result. In contrast to the normal everyday stress of modern life, chronic stress is a pathological state which can significantly interfere with daily living activities such as work, school and relationships, wreaking havoc on the body’s immune, metabolic and cardiovascular systems.

C

Of major concern is the impact on the brain. Researchers have found that the hippocampus, the control centre of memory and our ability to learn, can physically shrink in response to prolonged release of stress hormones like cortisol which result from chronic stress. Neurons in this area do not just get

smaller, but actually die, which weakens the neural connections, affecting the way memories are organised and stored in the brain. A chronically stressed person would recognise this as a 'brain fog', and it also has ramifications for other areas such as creativity and adaptability.

D

While this part of the brain gets smaller, another area, the amygdala, which is involved in processing emotions, can grow with chronic stress. Across species, a larger amygdala has been found to correlate with aggression and this, coupled with the weakened connection to the prefrontal cortex, the brain's decision-making centre, can profoundly impact mood and behaviour. With the link between emotions and decision-making compromised, a person is much less able to stop and reflect, becoming instead reactive and short-fused. Think of the difference between being able to tolerate a screaming child and instead giving in to the desire to scream back.

E

In the past, it was accepted that there was a limited number of neurons in the brain and as they died off as a result of ageing, stress or substance abuse, for instance, they were lost forever. It turns out, however, that this is not the case and that stem cells within the brain are actually able to create new neurons. In other words, lost neurons can be replaced. What makes this discovery even more powerful is the fact that replenishing neurons is rather straightforward. One of the most powerful stimulants for neuron growth is physical activity. So, in addition to its role in the reduction of stress hormones in the first place, and its ability to stimulate the release of endorphins, exercise has now been shown to contribute to the repair of the chronically stressed brain.

Source: <https://blog.e2language.com, ielts-match-heading>

Practice Exercises

Practice 1

Choose the correct heading for paragraphs **B–E** from the list of headings below.

Write the correct number, **i–vii**, in boxes 14–17 on your answer sheet.

List of Headings

- i** Seeking the transmission of radio signals from planets
- ii** Appropriate responses to signals from other civilisations
- iii** Vast distances to Earth's closest neighbours
- iv** Assumptions underlying the search for extra-terrestrial intelligence
- v** Reasons for the search for extra-terrestrial intelligence
- vi** Knowledge of extra-terrestrial life forms
- vii** Likelihood of life on other planets

Example
Paragraph A

Answer
v

14 Paragraph B

15 Paragraph C

16 Paragraph D

17 Paragraph E

Is there anybody out there?

A

The primary reason for the search is basic curiosity – the same curiosity about the natural world that drives all pure science. We want to know whether we are alone in the Universe. We want to know whether life evolves naturally if given the right conditions, or whether there is something very special about the Earth to have fostered the variety of life forms that we see around us on the planet. The simple detection of a radio signal will be sufficient to answer this most basic of all questions. In this sense, SETI is another cog in the machinery of pure science which is continually pushing out the horizon of our knowledge. However, there are other reasons for being interested in whether life exists elsewhere. For example,

we have had civilisation on Earth for perhaps only a few thousand years, and the threats of nuclear war and pollution over the last few decades have told us that our survival may be tenuous. Will we last another two thousand years or will we wipe ourselves out? Since the lifetime of a planet like ours is several billion years, we can expect that, if other civilisations do survive in our galaxy, their ages will range from zero to several billion years. Thus any other civilisation that we hear from is likely to be far older, on average, than ourselves. The mere existence of such a civilisation will tell us that long-term survival is possible, and gives us some cause for optimism. It is even possible that the older civilisation may pass on the benefits of their experience in dealing with threats to survival such as nuclear war and global pollution, and other threats that we haven't yet discovered.

B

In discussing whether we are alone, most SETI scientists adopt two ground rules. First, UFOs (Unidentified Flying Objects) are generally ignored since most scientists don't consider the evidence for them to be strong enough to bear serious consideration (although it is also important to keep an open mind in case any really convincing evidence emerges in the future). Second, we make a very conservative assumption that we are looking for a life form that is pretty well like us, since if it differs radically from us we may well not recognise it as a life form, quite apart from whether we are able to communicate

with it. In other words, the life form we are looking for may well have two green heads and seven fingers, but it will nevertheless resemble us in that it should communicate with its fellows, be interested in the Universe, live on a planet orbiting a star like our Sun, and perhaps most restrictively, have a chemistry, like us, based on carbon and water.

Explanation of answer

Question 14 :

Here, in line no.1 of Paragraph B, we find the mention of two ' ground rules ' that SETI scientists adopt. In the first ground rule, we can see the writer mentions in line no. 4-5 ,

... (although it is also important to keep an open mind in case any really convincing evidence emerges in the future.) This line suggests that there is no real evidence of extra - terrestrial intelligence so far , which indicates that these are only assumptions .

Again , in line no.5 , the author mentions , -... "Second , we make a very conservative assumption that ... " .

So , the answer is : lv (Assumptions underlying the search for extra - terrestrial Intelligence)

C

Even when we make these assumptions, our understanding of other life forms is still severely limited. We do not even know, for example, how many stars have planets, and we certainly do not know how likely it is that life will arise naturally, given the right conditions. However, when we look at the 100 billion stars in our galaxy (the Milky Way), and 100

billion galaxies in the observable Universe, it seems inconceivable that at least one of these planets does not have a life form on it; in fact, the best educated guess we can make, using the little that we do know about the conditions for carbon-based life, leads us to estimate that perhaps one in 100,000 stars might have a life-bearing planet orbiting it. That means that our nearest neighbours are perhaps 100 light years away, which is almost next door in astronomical terms.

D

An alien civilisation could choose many different ways of sending information across the galaxy, but many of these either require too much energy, or else are severely attenuated while traversing the vast distances across the galaxy. It turns out that, for a given amount of transmitted power, radio waves in the frequency range 1000 to 3000 MHz travel the greatest distance, and so all searches to date have concentrated on looking for radio waves in this frequency range. So far there have been a number of searches by various groups around the world, including Australian searches using the radio telescope at Parkes, New South Wales. Until now there have not been any detections from the few hundred stars which have been searched. The scale of the searches has been increased dramatically since 1992, when the US Congress voted NASA \$10 million per year for ten years to conduct a thorough search for extra-terrestrial life. Much of the money in this project is being spent on developing the special hardware needed to search many frequencies at once. The project has two parts. One part is a targeted search using the world's largest radio telescopes, the American-operated telescope in Arecibo, Puerto Rico and the French telescope in Nancy in France. This part of the project is searching the nearest 1000 likely stars with high sensitivity for signals in the frequency range 1000 to 3000 MHz. The other part of the project is an undirected search which is monitoring all of space with a lower sensitivity, using the smaller antennas of NASA's Deep Space Network.

E

There is considerable debate over how we should react if we detect a signal from an alien civilisation. Everybody agrees that we should not reply immediately. Quite apart from the impracticality of sending a reply over such large distances at short notice, it raises a host of ethical questions that would have to be addressed by the global community before any reply could be sent. Would the human race face the culture shock if faced with a superior and much older civilisation? Luckily, there is no urgency about this. The stars being searched are hundreds of light years away, so it takes hundreds of years for their signal to reach us, and a further few hundred years for our reply to reach them. It's not important, then, if there's a delay of a few years, or decades, while the human race debates the question of whether to reply, and perhaps carefully drafts a reply.

Source: Cambridge Book 9

Practice 2

Questions 27–30

Reading Passage 3 has six paragraphs, **A–F**.

Choose the correct heading for paragraphs **B–E** from the list of headings below.

Write the correct number, **i–vii**, in boxes 27–30 on your answer sheet.

List of Headings

- i** Commercial pressures on people in charge
- ii** Mixed views on current changes to museums
- iii** Interpreting the facts to meet visitor expectations
- iv** The international dimension
- v** Collections of factual evidence
- vi** Fewer differences between public attractions
- vii** Current reviews and suggestions

Example
Paragraph **A**

Answer
v

27 Paragraph **B**

28 Paragraph **C**

29 Paragraph **D**

30 Paragraph **E**

The development of museums

A

The conviction that historical relics provide infallible testimony about the past is rooted in the nineteenth and early twentieth centuries, when science was regarded as objective and value free. As one writer observes: 'Although it is now evident that artefacts are as easily altered as chronicles, public faith in

their veracity endures: a tangible relic seems ipso facto real.' Such conviction was, until recently, reflected in museum displays. Museums used to look - and some still do - much like storage rooms of objects packed together in showcases: good for scholars who wanted to study the subtle differences in design, but not for the ordinary visitor, to whom it all looked alike. Similarly, the information accompanying the objects often made little sense to the lay visitor. The content and format of explanations dated back to a time when the museum was the exclusive domain of the scientific researcher.

B

Recently, however, attitudes towards history and the way it should be presented have altered. The key word in heritage display is now 'experience', the more exciting the better and, if possible, involving all the senses. Good examples of this approach in the UK are the Jorvik Centre in York; the National Museum of Photography, Film and Television in Bradford; and the Imperial War Museum in London. In the US the trend emerged much earlier: Williamsburg has been a prototype for many heritage developments in other parts of the world. No one can predict where the process will end. On so-called heritage sites the re-enactment of historical events is increasingly popular, and computers will soon provide virtual reality experiences, which will present visitors with a vivid image of the period of their choice, in which they themselves can act as if part of the historical environment. Such developments have been criticised as an intolerable vulgarisation, but the success of many historical theme parks and similar locations suggests that the majority of the public does not share this opinion.

C

In a related development, the sharp distinction between museum and heritage sites on the one hand, and theme parks on the other, is gradually evaporating. They already borrow ideas and concepts from one another. For example, museums have adopted story lines for exhibitions, sites have accepted theming as a relevant tool, and theme parks are moving towards more authenticity and research-based presentations. In zoos, animals are no longer kept in cages, but in great spaces, either in the open air or in enormous greenhouses, such as the jungle and desert environments in Burgers Zoo in Holland. This particular trend is regarded as one of the major developments in the presentation of natural history in the twentieth century.

D

Theme parks are undergoing other changes, too, as they try to present more serious social and cultural issues, and move away from fantasy. This development is a response to market forces and, although museums and heritage sites have a special, rather distinct, role to fulfil, they are also operating in a very competitive environment, where visitors make choices on how and where to spend their free time. Heritage and museum experts do not have to invent stories and recreate historical environments to attract their visitors: their assets are already in place. However, exhibits must be both based on artefacts and facts as we know them, and attractively presented. Those who are professionally engaged in the art of interpreting history are thus in a difficult position, as they must steer a narrow course between the demands of 'evidence' and 'attractiveness', especially given the increasing need in the heritage industry for income-generating activities.

E

It could be claimed that in order to make everything in heritage more 'real', historical accuracy must be increasingly altered. For example, *Pithecanthropus erectus* is depicted in an Indonesian museum with Malay facial features, because this corresponds to public perceptions. Similarly, in the Museum of Natural History in Washington, a Neanderthal man is shown making a dominant gesture to his wife. Such presentations tell us more about contemporary perceptions of the world than about our ancestors. There is one compensation, however, for the professionals who make these interpretations: if they did not provide the interpretation, visitors would do it for themselves, based on their own ideas, misconceptions and prejudices. And no matter how exciting the result, it would contain a lot more bias than the presentations provided by experts.

F

Human bias is inevitable, but another source of bias in the representation of history has to do with the transitory nature of the materials themselves. The simple fact is that not everything from history survives the historical process. Castles, palaces and cathedrals have a longer lifespan than the dwellings of ordinary people. The same applies to the furnishings and other contents of the

premises. In a town like Leyden in Holland, which in the seventeenth century was occupied by approximately the same number of inhabitants as today, people lived within the walled town, an area more than five times smaller than modern Leyden. In most of the houses several families lived together in circumstances beyond our imagination. Yet in museums, fine period rooms give only an image of the lifestyle of the upper class of that era. No wonder that people who stroll around exhibitions are filled with nostalgia; the evidence in museums indicates that life was so much better in the past. This notion is induced by the bias in its representation in museums and heritage centres.

Source: Cambridge Book 9

Practice 3

Reading Passage has nine paragraphs, **A-I**.

Choose the correct heading for paragraphs **A-E** and **G-I** from the list of headings below.

Write the correct number **i-xi**, in boxes **1-8** on your answer sheet.

List of Headings

- i A fresh and important long-term goal
- ii Charging for roads and improving other transport methods
- iii Changes affecting the distances goods may be transported
- iv Taking all the steps necessary to change transport patterns
- v The environmental costs of road transport
- vi The escalating cost of rail transport
- vii The need to achieve transport rebalance
- viii The rapid growth of private transport
- ix Plans to develop major road networks
- x Restricting road use through charging policies alone
- xi Transport trends in countries awaiting EU admission

European Transport systems

A

It is difficult to conceive of vigorous economic growth without an efficient transport system. Although modern information technologies can reduce the demand for physical transport by facilitating teleworking and teleservices, the requirement for transport continues to increase. There are two key factors behind this trend. For passenger transport, the determining factor is the spectacular growth in car use. The number of cars on European Union (EU) roads saw an increase of three million cars each year from 1990 to 2010, and in the next decade the EU will see a further substantial increase in its fleet.

B

As far as goods transport is concerned, growth is due to a large extent to changes in the European economy and its system of production. In the last 20 years, as internal frontiers have been abolished, the EU has moved from a "stock" economy to a "flow" economy. This phenomenon has been emphasised by the relocation of some industries, particularly those which are labour intensive, to reduce production costs, even though the production site is hundreds or even thousands of kilometres away from the final assembly plant or away from users.

C

The strong economic growth expected in countries which are candidates for entry to the EU will also increase transport flows, in particular road haulage traffic. In 1998, some of these countries already exported more than twice their 1990 volumes and imported more than five times their 1990 volumes. And although many candidate countries inherited a transport system which encourages rail, the distribution between modes has tipped sharply in favour of road transport since the 1990s. Between 1990 and 1998, road haulage increased by 19.4%, while during the same period rail haulage decreased by 43.5%, although – and this could benefit the enlarged EU – it is still on average at a much higher level than in existing member states.

D

However, a new imperative-sustainable development – offers an opportunity

for adapting the EU's common transport policy. This objective, agreed by the Gothenburg European Council, has to be achieved by integrating environmental considerations into Community policies, and shifting the balance between modes of transport lies at the heart of its strategy. The ambitious objective can only be fully achieved by 2020, but proposed measures are nonetheless a first essential step towards a sustainable transport system which will ideally be in place in 30 years "time, that is by 2040.

E

In 1998, energy consumption in the transport sector was to blame for 28% of emissions of CO₂, the leading greenhouse gas. According to the latest estimates, if nothing is done to reverse the traffic growth trend, CO₂ emissions from transport can be expected to increase by around 50% to 1,113 billion tonnes by 2020, compared with the 739 billion tonnes recorded in 1990. Once again, road transport is the main culprit since it alone accounts for 84% of the CO₂ emissions attributable to transport. Using alternative fuels and improving energy efficiency is thus both an ecological necessity and a technological challenge.

F

Such a change cannot be achieved overnight, all the less so after over half a century of constant deterioration in favour of roads. This has reached such a pitch that today rail freight services are facing marginalisation, with just 8% of market share, and with international goods trains struggling along at an average speed of 18km/h. Three possible options have emerged.

G

The first approach would consist of focusing on road transport solely through pricing. This option would not be accompanied by complementary measures in the other modes of transport. In the short term it might curb the growth in road transport through the better loading ratio of goods vehicles and occupancy rates of passenger vehicles expected as a result of the increase in the price of transport. However, the lack of measures available to revitalise other modes of transport would make it impossible for more sustainable modes of transport to take up the baton.

H

The second approach also concentrates on road transport pricing but is accompanied by measures to increase the efficiency of the other modes (better quality of services, logistics, technology). However, this approach does not include investment in new infrastructure, nor does it guarantee better regional cohesion. It could help to achieve greater uncoupling than the first approach, but road transport would keep the lion's share of the market and continue to concentrate on saturated arteries, despite being the most polluting of the modes. It is therefore not enough to guarantee the necessary shift of the balance.

I

The third approach, which is not new, comprises a series of measures ranging from pricing to revitalising alternative modes of transport and targeting investment in the trans-European network. This integrated approach would allow the market shares of the other modes to return to their 1998 levels and thus make a shift of balance. It is far more ambitious than it looks, bearing in mind the historical imbalance in favour of roads for the last fifty years, but would achieve a marked break in the link between road transport growth and economic growth, without placing restrictions on the mobility of people and goods.

Source: Cambridge Book 10

Practice 4

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-ix, in boxes 1-7 on your answer sheet

List of Headings

- i The search for the reasons for an increase in population
- ii Industrialisation and the fear of unemployment
- iii The development of cities in Japan
- 4 The time and place of the Industrial Revolution

- iv The time and place of the Industrial Revolution
- v The cases of Holland, France and China
- vi Changes in drinking habits in Britain
- vii Two keys to Britain's industrial revolution
- viii Conditions required for industrialisation
- ix Comparisons with Japan lead to the answer

Tea and the industrial revolution

A

Alan Macfarlane, professor of anthropological science at King's College, Cambridge has, like other historians, spent decades wrestling with the enigma of the Industrial Revolution. Why did this particular Big Bang – the world-changing birth of industry-happen in Britain? And why did it strike at the end of the 18th century?

B

Macfarlane compares the puzzle to a combination lock. 'There are about 20 different factors and all of them need to be present before the revolution can happen,' he says. For industry to take off, there needs to be the technology and power to drive factories, large urban populations to provide cheap labour, easy transport to move goods around, an affluent middle-class willing to buy mass-produced objects, a market-driven economy and a political system that allows this to happen. While this was the case for England, other nations, such as Japan, the Netherlands and France also met some of these criteria but were not industrialising. All these factors must have been necessary. But not sufficient to cause the revolution, says Macfarlane. 'After all, Holland had everything except coal while China also had many of these factors. Most historians are convinced there are one or two missing factors that you need to open the lock.'

C

The missing factors, he proposes, are to be found in almost every kitchen

cupboard. Tea and beer, two of the nation's favourite drinks, fuelled the revolution. The antiseptic properties of tannin, the active ingredient in tea, and of hops in beer – plus the fact that both are made with boiled water – allowed urban communities to flourish at close quarters without succumbing to water-borne diseases such as dysentery. The theory sounds eccentric but once he starts to explain the detective work that went into his deduction, the scepticism gives way to wary admiration. Macfarlane's case has been strengthened by support from notable quarters – Roy Porter, the distinguished medical historian, recently wrote a favourable appraisal of his research.

D

Macfarlane had wondered for a long time how the Industrial Revolution came about. Historians had alighted on one interesting factor around the mid-18th century that required explanation. Between about 1650 and 1740, the population in Britain was static. But then there was a burst in population growth. Macfarlane says: 'The infant mortality rate halved in the space of 20 years, and this happened in both rural areas and cities, and across all classes. People suggested four possible causes. Was there a sudden change in the viruses and bacteria around? Unlikely. Was there a revolution in medical science? But this was a century before Lister's revolution*. Was there a change in environmental conditions? There were improvements in agriculture that wiped out malaria, but these were small gains. Sanitation did not become widespread until the 19th century. The only option left is food. But the height and weight statistics show a decline. So the food must have gotten worse. Efforts to explain this sudden reduction in child deaths appeared to draw a blank.'

E

This population burst seemed to happen at just the right time to provide labour for the Industrial Revolution. 'When you start moving towards an industrial revolution, it is economically efficient to have people living close together,' says Macfarlane. 'But then you get diseases, particularly from human waste.' Some digging around in historical records revealed that there was a change in the incidence of water-borne disease at that time, especially

dysentery. Macfarlane deduced that whatever the British were drinking must have been important in regulating disease. He says, 'We drank beer. For a long time, the English were protected by the strong antibacterial agent in hops, which were added to help preserve the beer. But in the late 17th century a tax was introduced on malt, the basic ingredient of beer. The poor turned to water and gin and in the 1720s the mortality rate began to rise again. Then it suddenly dropped again. What caused this?'

F

Macfarlane looked to Japan, which was also developing large cities about the same time, and also had no sanitation. Water-borne diseases had a much looser grip on the Japanese population than those in Britain. Could it be the prevalence of tea in their culture? Macfarlane then noted that the history of tea in Britain provided an extraordinary coincidence of dates. Tea was relatively expensive until Britain started a direct dipper trade with China in the early 18th century. By the 1740s, about the time that infant mortality was dipping, the drink was common. Macfarlane guessed that the fact that water had to be boiled, together with the stomach-purifying properties of tea meant that the breast milk provided by mothers was healthier than it had ever been. No other European nation sipped tea like the British, which, by Macfarlanes logic, pushed these other countries out of contention for the revolution.

G

But, if tea is a factor in the combination lock, why didn't Japan forge ahead in a tea-soaked industrial revolution of its own? Macfarlane notes that even though 17th-century Japan had large cities, high literacy rates, even a futures market, it had turned its back on the essence of any work-based revolution by giving up labour-saving devices such as animals, afraid that they would put people out of work. So, the nation that we now think of as one of the most technologically advanced entered the 19th century having 'abandoned the wheel'.

Source: Cambridge Book 10

Practice 5

Reading Passage has five paragraphs, **A-E**.

Choose the correct heading for paragraphs **B-E** from the list of headings below.

Write the correct number, **i-vii**, in boxes **1-4** on your answer sheet.

- i. Economic and social significance of tourism**
- ii. The development of mass tourism**
- iii. Travel for the wealthy**
- iv. Earning foreign exchange through tourism**
- v. Difficulty in recognising the economic effects of tourism**
- vi. The contribution of air travel to tourism**
- vii. The world impact of tourism**
- viii. The history of travel**

The context meaning and scope of tourism

A

Travel has existed since the beginning of time, when primitive man set out, often traversing great distances in search of game, which provided the food and clothing necessary for his survival. Throughout the course of history, people have travelled for purposes of trade, religious conviction, economic gain, war, migration and other equally compelling motivations. In the Roman era, wealthy aristocrats and high government officials also travelled for pleasure. Seaside resorts located at Pompeii and Herculaneum afforded citizens the opportunity to escape to their vacation villas in order to avoid the summer heat of Rome. Travel, except during the Dark Ages, has continued to grow and, throughout recorded history, has played a vital role in the development of civilisations and their economies.

B

Tourism in the mass form as we know it today is a distinctly twentieth-century phenomenon. Historians suggest that the advent of mass tourism began in England during the industrial revolution with the rise of the middle class and the availability of relatively inexpensive transportation. The creation of the commercial airline industry following the Second World War and the subsequent development of the jet aircraft in the 1950s signalled the rapid

growth and expansion of international travel. This growth led to the development of a major new industry: tourism. In turn, international tourism became the concern of a number of world governments since it not only provided new employment opportunities but also produced a means of earning foreign exchange.

C

Tourism today has grown significantly in both economic and social importance. In most industrialised countries over the past few years the fastest growth has been seen in the area of services. One of the largest segments of the service industry, although largely unrecognised as an entity in some of these countries, is travel and tourism. According to the World Travel and Tourism Council (1992), travel and tourism is the largest industry in the world on virtually any economic measure including value-added capital investment, employment and tax contributions. In 1992' the industry's gross output was estimated to be \$3.5 trillion, over 12 percent of all consumer spending. The travel and tourism industry is the world's largest employer with almost 130 million jobs, or almost 7 per cent of all employees. This industry is the world's leading industrial contributor, producing over 6 percent of the world's national product and accounting for capital investment in excess of \$422 billion m direct indirect and personal taxes each year. Thus, tourism has a profound impact both on the world economy and, because of the educative effect of travel and the effects on employment, on society itself.

D

However, the major problems of the travel and tourism industry that have hidden, or obscured, its economic impact are the diversity and fragmentation of the industry itself. The travel industry includes: hotels, motels and other types of accommodation; restaurants and other food services; transportation services and facilities; amusements, attractions and other leisure facilities; gift shops and a large number of other enterprises. Since many of these businesses also serve local residents, the impact of spending by visitors can easily be overlooked or underestimated. In addition, Meis (1992) points out that the tourism industry involves concepts that have remained amorphous to both analysts and decision makers. Moreover, in all nations this problem has made it difficult for the industry to develop any type of reliable or credible

tourism information base in order to estimate the contribution it makes to regional, national and global economies. However, the nature of this very diversity makes travel and tourism ideal vehicles for economic development in a wide variety of countries, regions or communities

E

Once the exclusive province of the wealthy, travel and tourism have become an institutionalised way of life for most of the population. In fact, McIntosh and Goeldner (1990) suggest that tourism has become the largest commodity in international trade for many nations and, for a significant number of other countries, it ranks second or third. For example, tourism is the major source of income in Bermuda, Greece, Italy, Spain, Switzerland and most Caribbean countries. In addition, Hawkins and Ritchie, quoting from data published by the American Express Company, suggest that the travel and tourism industry is the number one ranked employer in the Bahamas, Brazil, Canada, France, (the former) West Germany, Hong Kong, Italy, Jamaica, Japan, Singapore, the United Kingdom and the United States. However, because of problems of definition, which directly affect statistical measurement, it is not possible with any degree of certainty to provide precise, valid or reliable data about the extent of world-wide tourism participation or its economic impact. In many cases, similar difficulties arise when attempts are made to measure domestic tourism.

Source: Cambridge Book 10

Practice 6

Questions 1-7

Reading Passage has seven paragraphs, A-G.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, i-ix, in boxes 1-7 on your answer sheet.

List of Headings

- i Evidence of innovative environment management practices
- ii An undisputed answer to a question about the moai

- iii The future of the moai statues
- iv A theory which supports a local belief
- v The future of Easter Island
- vi Two opposing views about the Rapanui people
- vii Destruction outside the inhabitants' control
- viii How the statues made a situation worse
- ix Diminishing food resources

What destroyed the civilization of Easter island?

A

Easter Island, or Rapa Nui as it is known locally, is home to several hundred ancient human statues - the moai. After this remote Pacific island was settled by the Polynesians, it remained isolated for centuries. All the energy and resources that went into the moai - some of which are ten metres tall and weigh over 7,000 kilos - came from the island itself. Yet when Dutch explorers landed in 1722, they met a Stone Age culture. The moai were carved with stone tools, then transported for many kilometres, without the use of animals or wheels, to massive stone platforms. The identity of the moai builders was in doubt until well into the twentieth century. Thor Heyerdahl, the Norwegian ethnographer and adventurer, thought the statues had been created by pre-Inca peoples from Peru. Bestselling Swiss author Erich von Daniken believed they were built by stranded extraterrestrials. Modern science - linguistic, archaeological and genetic evidence - has definitively proved the moai builders were Polynesians, but not how they moved their creations. Local folklore maintains that the statues walked, while researchers have tended to assume the ancestors dragged the statues somehow, using ropes and logs.

B

When the Europeans arrived, Rapa Nui was grassland, with only a few scrawny trees. In the 1970s and 1980s, though, researchers found pollen preserved in lake sediments, which proved the island had been covered in lush palm forests for thousands of years. Only after the Polynesians arrived did those forests disappear. US scientist Jared Diamond believes that the Rapanui people - descendants of

of Polynesian settlers - wrecked their own environment. They had unfortunately settled on an extremely fragile island - dry, cool, and too remote to be properly fertilised by windblown volcanic ash. When the islanders cleared the forests for firewood and farming, the forests didn't grow back. As trees became scarce and they could no longer construct wooden canoes for fishing, they ate birds. Soil erosion decreased their crop yields. Before Europeans arrived, the Rapanui had descended into civil war and cannibalism, he maintains. The collapse of their isolated civilisation, Diamond writes, is a 'worst-case scenario for what may lie ahead of us in our own future'.

C

The moai, he thinks, accelerated the self-destruction. Diamond interprets them as power displays by rival chieftains who, trapped on a remote little island, lacked other ways of asserting their dominance. They competed by building ever bigger figures. Diamond thinks they laid the moai on wooden sledges, hauled over log rails, but that required both a lot of wood and a lot of people. To feed the people, even more land had to be cleared. When the wood was gone and civil war began, the islanders began toppling the moai. By the nineteenth century none were standing.

D

Archaeologists Terry Hunt of the University of Hawaii and Carl Lipo of California State University agree that Easter Island lost its lush forests and that it was an 'ecological catastrophe' - but they believe the islanders themselves weren't to blame. And the moai certainly weren't. Archaeological excavations indicate that the Rapanui went to heroic efforts to protect the resources of their wind-lashed, infertile fields. They built thousands of circular stone windbreaks and gardened inside them, and used broken volcanic rocks to keep the soil moist. In short, Hunt and Lipo argue, the prehistoric Rapanui were pioneers of sustainable farming.

E

Hunt and Lipo contend that moai-building was an activity that helped keep the peace between islanders. They also believe that moving the moai required few people and no wood, because they were walking upright. On that issue, Hunt and Lipo say, archaeological evidence backs up Rapanui folklore. Recent

experiments indicate that as few as 18 people could, with three strong ropes and a bit of practice, easily manoeuvre a 1,000 kg moai replica a few hundred metres. The figures' fat bellies tilted them forward, and a D-shaped base allowed handlers to roll and rock them side to side.

F

Moreover, Hunt and Lipo are convinced that the settlers were not wholly responsible for the loss of the island's trees. Archaeological finds of nuts from the extinct Easter Island palm show tiny grooves, made by the teeth of Polynesian rats. The rats arrived along with the settlers, and in just a few years, Hunt and Lipo calculate, they would have overrun the island. They would have prevented the reseedling of the slow-growing palm trees and thereby doomed Rapa Nui's forest, even without the settlers' campaign of deforestation. No doubt the rats ate birds' eggs too. Hunt and Lipo also see no evidence that Rapa Nui civilization collapsed when the palm forest did. They think its population grew rapidly and then remained more or less stable until the arrival of the Europeans, who introduced deadly diseases to which islanders had no immunity. Then in the nineteenth century slave traders decimated the population, which shrivelled to 111 people by 1877.

G

Hunt and Lipo's vision, therefore, is one of an island populated by peaceful and ingenious moai builders and careful stewards of the land, rather than by reckless destroyers ruining their own environment and society. 'Rather than a case of abject failure, Rapa Nui is an unlikely story of success', they claim. Whichever is the case, there are surely some valuable lessons which the world at large can learn from the story of Rapa Nui.

Source: Cambridge Book 11

Practice 7

Reading Passage has six paragraphs, **A-F**.

Choose the correct heading for paragraphs **A-F** from the list of headings below.

Write the correct number **i-viii**, in boxes **1-8** on your answer sheet

List of Headings:

- i Courses that require a high level of commitment
- ii A course title with two meanings
- iii The equal importance of two key issues
- iv Applying a theory in an unexpected context
- v The financial benefits of studying
- vi A surprising course title
- vii Different names for different outcomes
- viii The possibility of attracting the wrong kind of student

What's the purpose of gaining knowledge

A

'I would find an institution where any person can find instruction in any subject' That was the founders motto for Cornell University, and it seems an apt characterization of the different university, also in the USA, where I currently teach philosophy. A student can prepare for a career in resort management, engineering, interior design, accounting, music, law enforcement, you name it. But what would the founders of these two institutions have thought of a course called Arson for Profit'? I kid you not: we have it in the books. Any undergraduates who have met the academic requirements can sign up for the course in our program in 'fire science'.

B

Naturally, the course is intended for prospective arson investigators, who can learn all the tricks of the trade for detecting whether a fire was deliberately set, discovering who did it, and establishing a chain of evidence for effective prosecution in a court of law. But wouldn't this also be the perfect course for prospective arsonists to sign up for? My point is not to criticize academic programs in fire science: they are highly welcome as part of the increasing professionalization of this and many other occupations. However, it's not

unknown for a firefighter to torch a building. This example suggests how dishonest and illegal behavior, with the help of higher education, can creep into every aspect of public and business life.

C

I realized this anew when I was invited to speak before a class in marketing, which is another of our degree programs. The regular instructor is a colleague who appreciates the kind of ethical perspective I can bring as a philosopher. There are endless ways I could have approached this assignment, but I took my cue from the title of the course: 'Principles of Marketing'. It made me think to ask the students, 'Is marketing principled?' After all, a subject matter can have principles in the sense of being codified, having rules, as with football or chess, without being principled in the sense of being ethical. Many of the students immediately assumed that the answer to my question about marketing principles was obvious: no. Just look at the ways in which everything under the sun has been marketed; obviously it need not be done in a principled (=ethical) fashion.

D

Is that obvious? I made the suggestion, which may sound downright crazy in light of the evidence, that perhaps marketing is by definition principled. My inspiration for this judgement is the philosopher Immanuel Kant, who argued that any body of knowledge consists of an end (or purpose) and a means.

E

Let us apply both the terms 'means' and 'end' to marketing. The students have signed up for a course in order to learn how to market effectively. But to what end? There seem to be two main attitudes toward that question. One is that the answer is obvious: the purpose of marketing is to sell things and to make money. The other attitude is that the purpose of marketing is irrelevant: Each person comes to the program and course with his or her own plans, and these need not even concern the acquisition of marketing expertise as such. My proposal, which I believe would also be Kant's, is that neither of these attitudes captures the significance of the end to the means for marketing. A field of knowledge or a professional endeavor is defined by both the means and the end; hence both deserve scrutiny. Students need to study both how to achieve X, and also what X is.

F

It is at this point that 'Arson for Profit' becomes supremely relevant. That course is presumably all about means: how to detect and prosecute criminal activity. It is therefore assumed that the end is good in an ethical sense. When I ask fire science students to articulate the end, or purpose, of their field, they eventually generalize to something like, 'The safety and welfare of society,' which seems right. As we have seen, someone could use the very same knowledge of means to achieve a much less noble end, such as personal profit via destructive, dangerous, reckless activity. But we would not call that firefighting. We have a separate word for it: arson. Similarly, if you employed the 'principles of marketing' in an unprincipled way, you would not be doing marketing. We have another term for it: fraud. Kant gives the example of a doctor and a poisoner, who use the identical knowledge to achieve their divergent ends. We would say that one is practicing medicine, the other, murder.

Source: Cambridge Book 12

Practice 8

Reading Passage has seven paragraphs, **A-G**.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, **i-viii**, in boxes **14-20** on your answer sheet.

List of Headings

- i. Different accounts of the same journey
- ii. Bingham gains support
- iii. A common belief
- iv. The aim of the trip
- v. A dramatic description
- vi. A new route
- vii. Bingham publishes his theory
- viii. Bingham's lack of enthusiasm

The lost city

An explorer's encounter with the ruined city of Machu Picchu, the most famous icon of the Inca civilisation

A

When the US explorer and academic Hiram Bingham arrived in South America in 1911, he was ready for what was to be the greatest achievement of his life: the exploration of the remote hinterland to the west of Cusco, the old capital of the Inca empire in the Andes mountains of Peru. His goal was to locate the remains of a city called Vitcos, the last capital of the Inca civilization. Cusco lies on a high plateau at an elevation of more than 3,000 metres, and Bingham's plan was to descend from this plateau along the valley of the Urubamba river, which takes a circuitous route down to the Amazon and passes through an area of dramatic canyons and mountain ranges.

B

When Bingham and his team set off down the Urubamba in late July, they had an advantage over travellers who had preceded them: a track had recently been blasted down the valley canyon to enable rubber to be brought up by mules from the jungle. Almost all previous travellers had left the river at Ollantaytambo and taken a high pass across the mountains to rejoin the river lower down, thereby cutting a substantial corner, but also therefore never passing through the area around Machu Picchu.

C

On 24 July they were a few days into their descent of the valley. The day began slowly, with Bingham trying to arrange sufficient mules for the next stage of the trek. His companions showed no interest in accompanying him up the nearby hill to see some ruins that a local farmer, Melchor Arteaga, had told them about the night before. The morning was dull and damp, and also seems to have been less than keen on the prospect of climbing the hill. In his book *Lost City of the Incas*, he relates that he made the ascent without having the least expectation that he would find anything at the top.

D

Bingham writes about the approach in vivid style in his book. First, as he

climbs up the hill, he describes the ever-present possibility of deadly snakes, 'capable of making considerable springs when in pursuit of their prey'; not that he sees any. Then there's a sense of mounting discovery as he comes across great sweeps of terraces, then a mausoleum, followed by monumental staircases and, finally, the grand ceremonial buildings of Machu Picchu. 'It seemed like an unbelievable dream. The sight held me spellbound ', he wrote.

E

We should remember, however, that Lost City of the Incas is a work of hindsight, not written until 1948, many years after his journey. His journal entries of the time reveal a much more gradual appreciation of his achievement. He spent the afternoon at the ruins noting down the dimensions of some of the buildings, then descended and rejoined his companions, to whom he seems to have said little about his discovery. At this stage, didn't realise the extent or the importance of the site, nor did he realise what use he could make of the discovery.

F

However, soon after returning it occurred to him that he could make a name for himself from this discovery. When he came to write the National Geographic magazine article that broke the story to the world in April 1913, he knew he had to produce a big idea.

He wondered whether it could have been the birthplace of the very first Inca, Manco the Great, and whether it could also have been what chroniclers described as 'the last city of the Incas'. This term refers to Vilcabamba, the settlement where the Incas had fled from Spanish invaders in the 1530s. Bingham made desperate attempts to prove this belief for nearly 40 years. Sadly, his vision of the site as both the beginning and end of the Inca civilization, while a magnificent one, is inaccurate. We now know that Vilcabamba actually lies 65 kilometres away in the depths of the jungle.

G

One question that has perplexed visitors, historians and archaeologists alike ever since Bingham, is why the site seems to have been abandoned before the Spanish Conquest. There are no references to it by any of the Spanish chroniclers - and if they had known of its existence so close to Cusco they would certainly have come in search of gold.

An idea which has gained wide acceptance over the past few years is that it was a, a country estate built by an Inca emperor to escape the cold winters of Cusco, where the elite could enjoy monumental architecture and spectacular views. Furthermore, the particular architecture of Machu Picchu suggests that it was constructed at the time of the greatest of all the Incas, the emperor Pachacuti (1438-71). By custom, Pachacuti's descendants built other similar estates for their own use, and so Machu Picchu would have been abandoned after his death, some 50 years before the Spanish Conquest.

Source: Cambridge Book 12

Practice 9

Choose the correct heading for paragraphs B and D–F from the list of headings below.

Write the correct number, i–ix, in boxes 14–17 on your answer sheet.

List of Headings

- i Predicting climatic changes
- ii The relevance of the Little Ice Age today
- iii How cities contribute to climate change
- iv Human impact on the climate
- v How past climatic conditions can be determined
- vi A growing need for weather records
- vii A study covering a thousand years
- viii People have always responded to climate change
- ix Enough food at last

Example
Paragraph A

Answer
viii

14 Paragraph B

<i>Example</i> Paragraph C	<i>Answer</i> V
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The little ice age**A**

This book will provide a detailed examination of the Little Ice Age and other climatic shifts, but, before I embark on that, let me provide a historical context. We tend to think of climate - as opposed to weather - as something unchanging, yet humanity has been at the mercy of climate change for its entire existence, with at least eight glacial episodes in the past 730,000 years. Our ancestors adapted to the universal but irregular global warming since the end of the last great Ice Age, around 10,000 years ago, with dazzling opportunism. They developed strategies for surviving harsh drought cycles, decades of heavy rainfall or unaccustomed cold; adopted agriculture and stock-raising, which revolutionised human life; and founded the world's first pre-industrial civilisations in Egypt, Mesopotamia and the Americas. But the price of sudden climate change, in famine, disease and suffering, was often high.

B

The Little Ice Age lasted from roughly 1300 until the middle of the nineteenth century. Only two centuries ago, Europe experienced a cycle of bitterly cold winters; mountain glaciers in the Swiss Alps were the lowest in recorded memory, and pack ice surrounded Iceland for much of the year. The climatic events of the Little Ice Age did more than help shape the modern world. They are the deeply important context for the current unprecedented global warming. The Little Ice Age was far from a deep freeze, however; rather an irregular seesaw of rapid climatic shifts, few lasting more than a quarter-century, driven by complex and still little understood interactions between the atmosphere and the ocean. The seesaw brought cycles of intensely cold winters and easterly winds, then switched abruptly to years of heavy spring and early summer rains, mild winters, and frequent Atlantic storms, or to periods of droughts, light north easterly winds, and summer heat waves.

C

Reconstructing the climate changes of the past is extremely difficult, because systematic weather observations began only a few centuries ago, in Europe and North America. Records from India and tropical Africa are even more recent. For the time before records began, we have only 'proxy records' reconstructed largely from tree rings and ice cores, supplemented by a few incomplete written accounts. We now have hundreds of tree-ring records from throughout the northern hemisphere, and many from south of the equator, too, amplified with a growing body of temperature data from ice cores drilled in Antarctica, Greenland, the Peruvian Andes, and other locations. We are close to a knowledge of annual summer and winter temperature variations over much of the northern hemisphere going back 600 years.

D

This book is a narrative history of climatic shifts during the past ten centuries, and some of the ways in which people in Europe adapted to them. Part One describes the Medieval Warm Period, roughly 900 to 1200. During these three centuries, Norse voyagers from Northern Europe explored northern seas, settled Greenland, and visited North America. It was not a time of uniform warmth, for then, as always since the Great Ice Age, there were constant shifts in rainfall and temperature. Mean European temperatures were about the same as today, perhaps slightly cooler.

E

It is known that the Little Ice Age cooling began in Greenland and the Arctic in about 1200. As the Arctic ice pack spread southward, Norse voyages to the west were rerouted into the open Atlantic, then ended altogether. Storminess increased in the North Atlantic and North Sea. Colder, much wetter weather descended on Europe between 1315 and 1319, when thousands perished in a continent-wide famine. By 1400, the weather had become decidedly more unpredictable and stormier, with sudden shifts and lower temperatures that culminated in the cold decades of the late sixteenth century. Fish were a vital commodity in growing towns and cities, where food supplies were a constant concern. Dried cod and herring were already the staples of the European fish trade, but changes in water temperatures forced fishing fleets to work further

offshore. The Basques, Dutch, and English developed the first offshore fishing boats adapted to a colder and stormier Atlantic. A gradual agricultural revolution in northern Europe stemmed from concerns over food supplies at a time of rising populations. The revolution involved intensive commercial farming and the growing of animal fodder on land not previously used for crops. The increased productivity from farmland made some countries self-sufficient in grain and livestock and offered effective protection against famine.

F

Global temperatures began to rise slowly after 1850, with the beginning of the Modern Warm Period. There was a vast migration from Europe by land-hungry farmers and others, to which the famine caused by the Irish potato blight contributed, to North America, Australia, New Zealand, and southern Africa. Millions of hectares of forest and woodland fell before the newcomers' axes between 1850 and 1890, as intensive European farming methods expanded across the world. The unprecedented land clearance released vast quantities of carbon dioxide into the atmosphere, triggering for the first time humanly caused global warming. Temperatures climbed more rapidly in the twentieth century as the use of fossil fuels proliferated and greenhouse gas levels continued to soar. The rise has been even steeper since the early 1980s. The Little Ice Age has given way to a new climatic regime, marked by prolonged and steady warming. At the same time, extreme weather events like Category 5 hurricanes are becoming more frequent.

Source: Cambridge Book 8

Practice 10

Questions 14–19

Reading Passage 2 has seven paragraphs, **A–G**.

Choose the correct heading for paragraphs **A** and **C–G** from the list below.

Write the correct number, **i–x**, in boxes 14–19 on your answer sheet.

List of Headings	
i	Disobeying FAA regulations
ii	Aviation disaster prompts action
iii	Two coincidental developments
iv	Setting altitude zones
v	An oversimplified view
vi	Controlling pilots' licences
vii	Defining airspace categories
viii	Setting rules to weather conditions
ix	Taking off safely
x	First steps towards ATC

14 Paragraph A

<i>Example</i> Paragraph B	<i>Answer</i> x
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15 Paragraph C

16 Paragraph D

17 Paragraph E

18 Paragraph F

19 Paragraph G

Air traffic control in USA

A

An accident that occurred in the skies over the Grand Canyon in 1956 resulted in the establishment of the Federal Aviation Administration (FAA) to regulate and oversee the operation of aircraft in the skies over the United States, which were becoming quite congested. The resulting structure of air traffic control has greatly increased the safety of flight in the United States, and similar air traffic control procedures are also in place over much of the rest of the world.

B

Rudimentary air traffic control (ATC) existed well before the Grand Canyon disaster. As early as the 1920s, the earliest air traffic controllers manually guided aircraft in the vicinity of the airports, using lights and flags, while beacons and flashing lights were placed along cross-country routes to establish the earliest

airways. However, this purely visual system was useless in bad weather, and, by the 1930s, radio communication was coming into use for ATC. The first region to have something approximating today's ATC was New York City, with other major metropolitan areas following soon after.

C

In the 1940s, ATC centres could and did take advantage of the newly developed radar and improved radio communication brought about by the Second World War, but the system remained rudimentary. It was only after the creation of the FAA that full-scale regulation of America's airspace took place, and this was fortuitous, for the advent of the jet engine suddenly resulted in a large number of very fast planes, reducing pilots' margin of error and practically demanding some set of rules to keep everyone well separated and operating safely in the air.

D

Many people think that ATC consists of a row of controllers sitting in front of their radar screens at the nation's airports, telling arriving and departing traffic what to do. This is a very incomplete part of the picture. The FAA realised that the airspace over the United States would at any time have many different kinds of planes, flying for many different purposes, in a variety of weather conditions, and the same kind of structure was needed to accommodate all of them.

E

To meet this challenge, the following elements were put into effect. First, ATC extends over virtually the entire United States. In general, from 365m above the ground and higher, the entire country is blanketed by controlled airspace. In certain areas, mainly near airports, controlled airspace extends down to 215m above the ground, and, in the immediate vicinity of an airport, all the way down to the surface. Controlled airspace is that airspace in which FAA regulations apply. Elsewhere, in uncontrolled airspace, pilots are bound by fewer regulations. In this way, the recreational pilot who simply wishes to go flying for a while without all the restrictions imposed by the FAA has only to stay in uncontrolled airspace, below 365m, while the pilot who does want the protection afforded by ATC can easily enter the controlled airspace.

F

The FAA then recognised two types of operating environments. In good meteorological conditions, flying would be permitted under Visual Flight Rules (VFR), which suggests a strong reliance on visual cues to maintain an acceptable level of safety. Poor visibility necessitated a set of Instrument Flight Rules (IFR), under which the pilot relied on altitude and navigational information provided by the plane's instrument panel to fly safely. On a clear day, a pilot in controlled airspace can choose a VFR or IFR flight plan, and the FAA regulations were devised in a way which accommodates both VFR and IFR operations in the same airspace. However, a pilot can only choose to fly IFR if they possess an instrument rating which is above and beyond the basic pilot's license that must also be held.

G

Controlled airspace is divided into several different types, designated by letters of the alphabet. Uncontrolled airspace is designated Class F, while controlled airspace below 5,490m above sea level and not in the vicinity of an airport is Class E. All airspace above 5,490m is designated Class A. The reason for the division of Class E and Class A airspace stems from the type of planes operating in them. Generally, Class E airspace is where one finds general aviation aircraft (few of which can climb above 5,490m anyway), and commercial turboprop aircraft. Above 5,490m is the realm of the heavy jets, since jet engines operate more efficiently at higher altitudes. The difference between Class E and A airspace is that in Class A, all operations are IFR, and pilots must be instrument-rated, that is, skilled and licensed in aircraft instrumentation. This is because ATC control of the entire space is essential. Three other types of airspace, Classes D, C and B, govern the vicinity of airports. These correspond roughly to small municipal, medium-sized metropolitan and major metropolitan airports respectively, and encompass an increasingly rigorous set of regulations. For example, all a VFR pilot has to do to enter Class C airspace is establish two-way radio contact with ATC. No explicit permission from ATC to enter is needed, although the pilot must continue to obey all regulations governing VFR flight. To enter Class B airspace, such as on approach to a major metropolitan airport, an explicit ATC clearance is required. The private pilot who cruises without permission into this airspace risks losing their license.

Source: Cambridge Book 8

Global Question

Definition:

- Global Questions test how well you understand the main theme of the whole passage by asking about the writer's purpose, a suitable title, or the main idea.
- Sometimes the passage does not have a title or subheading if there is a global multiple-choice Question.

Strategies:

1. Identify the main idea of every paragraph
2. String them together to get the Main idea/theme of the whole passage.
3. If the Question is about the writer's tone – pay attention to tone as you read – Is the writer positive, negative, or neutral about the topic under study.

Practice Exercise 1

A) Europeans tend to be skeptical about the consumption of genetically modified foods and there is strong consumer pressure, supported by the Green parties, to ban farmers from growing GM crops in the European Union (EU). However, 5.5 million farmers worldwide, mainly in the US, Argentina, Canada and China, now grow GM crops covering more than 50 million hectares, an area the size of Spain. Other Asian countries such as India are enthusiastic and Indonesia is about to join the GM club, so despite the Europeans, GM crop growth is increasing globally.

B) A recent British scientists' report emphasizes that inserting genes into plants is still a very inexact science, so unexpected biochemical side effects are possible, affecting foodstuffs and human consumers. Legally, GM companies have to demonstrate that their crops are "substantially equivalent" to the originals, but what does this mean? That they should contain the same nutrients? That they should look and smell similar? Scientists who not long ago dismissed public concerns as hysteria are now concurring with green consumer activists and advising tougher regulation.

C) More consensus and definition is required on this controversial topic.

Currently, it seems that most American consumers trust GM food producers and associated big businesses, whilst Europeans do not. Canadians are skeptical: their studies of cross pollinated "super strains" indicate problems such as potential super viruses. Dutch studies however, suggest that engineered sugar beet is friendlier to wildlife and less damaging to the environment: it needs less herbicide for the same yield, allowing more weed biomass and increased insects and spiders, which in turn feed increased birdlife. These results are significant, as European law states that GM crops may be banned if they can be proved to damage the environment.

D) Attitudes to GM crops appear to depend on where one lives and what one does. Cotton farmers in South Africa are very enthusiastic, as their first GM cotton crop proved extremely successful, boosting yields by 50 - 90%. "Bt cotton" contains a gene for a bacterial toxin that kills their major pest, bollworms and reduces the need for pesticides. Growing GM cotton requires less labour time, an important factor in a region ravaged by HIV/AIDS. Bt cotton seed yield shows increases of up to 129%; unsurprisingly, use grew from only 0.1 per cent of farmers in 1997/98 to

over 90 per cent by 2001/02. Opponents of GM crops claim that pests will develop resistance soon and that small farmers relying completely on the modified strain are particularly vulnerable to changes in market conditions.

E) India is also pleased with its high relative yields of GM cotton and generally, yield increases in the developing world are turning out to be much higher than those of the 'first' world. It is understandable therefore, that developing countries are keen to embrace GM foods and farming methods, whilst many western farmers and consumers remain skeptical.

F) Meanwhile, in Hong Kong, the government's leaflet, 'GM Food Newsletter', is annoying consumer activists and environmentalists. In the leaflet, a university biotechnology student explains to her mother that all GM foods are safety-assessed and are "as safe as their conventional counterparts". The Food and Environmental Hygiene Department says it was published "with a view to enhancing the knowledge of the public on GM food".

G) Greenpeace call it "blatant pro-GM food propaganda" however, and claim "The government is pushing GM food safety whilst at the same time understating the potential risks". It adds the government's role is "to educate and inform the

public, not to blatantly promote what is an unproven technology." Greenpeace do not believe that a reasonable system of pre-market safety assessments exists in Hong Kong and have been actively campaigning for the compulsory labelling of GM ingredients. The government argues that assessment is adequate enough to allay public fears and that labelling of GM foods should be voluntary.

H) Park'n'Shop and Wellcome allow distribution of the GM newsletter, but a spokeswoman said this did not necessarily imply active approval of GM foods, adding they had previously helped the government deliver a series of education leaflets, posters and information on SARS and dengue fever. "Our policy on GM food is neutral," she said.

List Of Headings

1. Environmentalists' reaction
2. Differing yields in developing and 'first' worlds
3. Increased yields in Bt cotton
4. Hong Kong government's 'marketing' of GM foods
5. Legal implications
6. Reactions to GM cotton
7. Growing importance of GM foods
8. GM crops and viruses
9. Attitudes worldwide to GM foods
10. Supermarkets' policy

Answer:

Paragraph

- A) 7. Growing importance of GM foods
- B) 5. Legal implications
- C) 9. Attitudes worldwide to GM foods
- D) 6. Reactions to GM cotton
- E) 2. Differing yields in developing and 'first' worlds
- F) 4. Hong Kong government's 'marketing' of GM foods
- G) 1. Environmentalists' reaction
- H) 10. Supermarkets' policy

Global Question

Choose ONE letter A-D

Q1. Which of the following is the most suitable title for the reading passage?

- A. Damage to the environment because of genetically modified crops and foods
- B. GM foods creating annoyance among consumer activists and environmentalists
- C. Divided opinions over genetically modified crops and foods
- D. How GM foods are ruling the consumer market.

Explanation for Q1 :

Once you have Identified the main idea of every paragraph as above, string them together to get the Main idea/theme of the whole passage and answer the global question.

In this case after understanding the main idea/theme, the most suitable title for the reading passage is C as option A, B and D are either one of the ideas or a part of the topic.

Answer: C

Source: <https://elc.polyu.edu.hk/ielts>, *Divided opinions over genetically modified crops and foods*

Practice Exercise 2

1. Fiorentina's exclusion from the UEFA Cup after a match official was injured by a firecracker thrown during their second-round match with Grasshopper Zurich in Salerno brought hooliganism back in the media.
2. The Florence club are appealing against the decision, arguing that the object was thrown by rival Salernitana fans and the ban would set a dangerous precedent. But UEFA will have borne in mind that Fiorentina were playing so far away from home only because they had been banned from their own ground for crowd trouble in Europe last season.

3. Whether Fiorentina have been hard done by or not, fan violence is a problem in the Italian game. Fighting before Sunday's 1-1 draw between Bologna and Roma left eight people in hospital, two with stab wounds. After the game a Roma supporters' bus was stoned and set on fire.

4. But Italy is not the only country suffering from what used to be called "the English disease". At the weekend police in Bucharest fired tear-gas and made 20 arrests after a pitch invasion at the Steaua-Dinamo derby, reflecting a marked growth in hooliganism in Romania. The Greek first division match between PAOK Thessaloniki and Olympiakos Piraeus last week was abandoned after one of the linesmen was left concussed by home fans furious at a disallowed goal, a decision which brought 10,000 people on to the streets of Salonika in protest. In neighbouring Albania, Skenderbeu Korce were fined and docked three points last month after a brawl involving players, fans and the referee.

5. Hooliganism is taking its toll on the South American game too. An Argentinian judge suspended all second division matches this month in an effort to combat rising violence. The same judge halted the first division for two weeks in May for the same reason.

6. Football violence has claimed 37 lives in Argentina in the Nineties and leading clubs routinely have to dole out free tickets and cash to their gangsterish fans, known as Barras bravas, whose activities include extortion. This is leading to a frightening atmosphere. A recent survey in Brazil found that 61 percent of fans said they stayed away from matches because they were too scared to attend.

7. FIFA is considering the postponement of the Confederations Cup, scheduled for January, which may persuade the world champions France to take part, a FIFA spokesman said yesterday.

Match the Headings with the paragraphs:

List of Headings

- i. A climate of fear
- ii. Fan violence returns
- iii. FIFA's response

- iv. Cancelling the cup
- v. Legal action is taken
- vi. Not just the fans
- vii. Italy has a serious problem
- viii. Not to blame
- ix. Violence in the news again
- x. A widespread problem

Answer:

Paragraph

- 1. ix
- 2. viii
- 3. vii
- 4. x
- 5. v
- 6. i
- 7. iii

Global Question

Choose ONE letter A-D

Q1. Which of the following is the most suitable title for the reading passage?

- A. Rules of Soccer
- B. Suspension of players
- C. Soccer Violence
- D. Hooliganism in Romania

Source: <https://www.ieltsbuddy.com/>, *Soccer Violence*

Practice Exercise 3

A) People have always dreamed of leaving planet Earth and exploring outer space. Sputnik, the first artificial satellite, was launched in 1957. A human being went into space in 1961. Nowadays, aided by huge technological advancements, astronauts spend up to a year orbiting space stations and robotic explorers have visited nearly all the planets in our solar system.

B) The first challenge of space exploration was developing rockets powerful enough to escape Earth's gravity, with guidance systems reliable enough to reach their destinations. The next was constructing lightweight, durable satellites and maintaining radio communication with them. Exceptionally high standards of reliability in manufacturing and testing are necessary and a number of product innovations in daily use are a result of attempts to solve specific logistical problems connected with life in space.

C) In addition to overcoming the challenges of no atmosphere, extremes of temperature and cosmic radiation, it was necessary to develop tools and techniques for space navigation, scientific observations and experiments and coping with incidental crises as they arose. The Apollo program, which in 1969 sent astronauts to the Moon and back, was a huge achievement watched globally by millions on (pre satellite) TV, although some have subsequently claimed that the whole spectacle was an elaborate hoax.

D) Emphasis then shifted to maximizing efficiency and comfort during long-term stays on space stations and developing reusable spacecraft. The latter resulted in the space shuttle fleet but encountered a major setback when the U.S. spaceship Challenger exploded shortly after takeoff in 1986.

E) A great advantage of putting satellites into space is the ability to look back at Earth (Landsat1 went into polar orbit in 1972). Large-scale photos enable observation of land masses, oceans and weather patterns, remote regions can be mapped in detail and electromagnetic cameras return a wealth of useful data, for example infrared images which allow researchers to discriminate between healthy crops and diseased ones.

F) Objects such as stars emit electromagnetic radiation, different wavelengths of which provide scientists with various types of information about the universe. Infrared radiation reveals objects that are not hot enough to emit visible light,

such as dust clouds. X rays can indicate extremely high temperatures caused by violent collisions or other events. Earth's atmosphere absorbs high-energy radiation in order for life to exist on the planet, but it also hides many celestial objects from ground-based telescopes. Satellite data has enabled the first cosmic map and discovered further evidence for the 'Big Bang' theory of the origin of the universe. The Hubble telescope, sent into orbit in 1990, provides astronomers with spectacularly detailed images of space. Satellites are used for political reasons too: the classified 'keyhole' system is reported to be able to read a car license plate from 100 miles in orbit, while military uses include detection of missiles and nuclear weapons and the development of the Global Positioning System, extensively used for navigation.

G) The future of space exploration depends on many factors: technological evolution, political rivalries and partnerships between nations, and public attitudes to continuing costly space exploration. Human spaceflight in Earth's orbit and unpiloted spaceflight within the solar system will continue. Piloted spaceflight to other planets or any flight to other solar systems remains distant, but advances in space technology could take space exploration into the areas of contemporary science fiction. Despite all this, the Apollo astronauts claimed that their personal greatest discovery from the Moon voyages was an increased spiritual awareness of planet Earth as a small but beautiful oasis of life in an essentially empty and impersonal universe.

List of headings:

1. Earth watching
2. From Sputnik to now
3. An elaborate hoax
4. Man on the moon
5. Space shuttles
6. More satellite uses
7. Distant solar systems
8. Development and production challenges
9. The future and the spiritual

Answer:**Paragraph**

- A) 2. From Sputnik to now

- B) 8. Development and production challenges
- C) 4. Man on the moon
- D) 5. Space shuttles
- E) 1. Earth watching
- F) 6. More satellite uses
- G) 9. The future and the spiritual

Global Question

Choose **ONE** letter A-D

Q1. Which of the following is the most suitable title for the reading passage?

- A. Space Travel
- B. Satellite data
- C. Earth's orbit
- D. Developing reusable spacecraft

Source: <https://elc.polyu.edu.hk/>, *Space Travel*

Matching information

Definition:

You have some statements from your text, and a list of options (listed A, B, C etc.).

Your task is to match each statement with the correct option.

Strategies:

1. Look at the given options (A, B, C) and underline the keywords
2. Use scanning to find the key words from the statement in the text.
3. Do detailed reading to find the correct answer
4. Read the statements. If the statement corresponds to what you have just read, then classify it as A. Repeat these steps with other options (B, C etc.)

TIP:

Answers do not necessarily appear in order of the passage. You may use each option more than once.

IN-CLASS CONTENT

Exercise 1

The Search for Extraterrestrial Intelligence**QUESTIONS :**

- I) Seeking the transmission of radio signals from planets
- ii) Appropriate responses to signals from other civilizations
- iii) Vast distances to Earth's closest neighbours
- iv) Assumptions underlying the search for extra-terrestrial intelligence
- v) Reasons for the search for extraterrestrial intelligence
- vi) Knowledge of extra-terrestrial life forms
- vii) Likelihood of life on other planets

A.

The primary reason for the search is basic curiosity – the same curiosity about the natural world that drives all pure science. We want to know whether we are alone in the Universe. We want to know whether life evolves naturally if given the right conditions, or whether there is something very special about the Earth to have fostered the variety of life forms that we see around us on the planet. The simple detection of a radio signal will be sufficient to answer this most basic of all questions. In this sense, SETI is another cog in the machinery of pure science which is continually pushing out the horizon of our knowledge. However, there are other reasons for being interested in whether life exists elsewhere. For example, we have had civilization on Earth for perhaps only a few thousand years, and the threats of nuclear war and pollution over the last few decades have told us that our survival may be tenuous. Will we last another two thousand years or will we wipe ourselves out? Since the lifetime of a planet like ours is several billion years, we can expect that if other civilizations do survive in our galaxy, their ages will range from zero to several billion years. Thus any other civilization that we hear from is likely to be far older on average than ourselves. The mere existence of such a civilization will tell us that long-term survival is possible, and gives us some cause for optimism. It is even possible that the older civilization may pass on the benefits of their experience in dealing with threats

to survival such as nuclear war and global pollution, and other threats that we haven't yet discovered.

B.

In discussing whether we are alone, most SETI scientists adopt two ground rules. First, UFOs [Unidentified Flying objects] are generally ignored since most scientists don't consider the evidence for them to be strong enough to bear serious consideration (although it is also important to keep an open mind in case any really convincing evidence emerges in the future). Second, we make a very conservative assumption that we are looking for a life form that is pretty well like us, since if it differs radically from us we may well not recognize it as a life form, quite apart from whatever we are able to communicate with it. In other words, the life form we are looking for may well have two green heads and seven fingers, but it will nevertheless resemble us in that it should communicate with its fellows, be interested in the Universe, live on a planet orbiting a star like our Sun, and perhaps most restrictively have chemistry, like us, based on carbon and water.

C.

Even when we make these assumptions, our understanding of other life forms is still severely limited. We do not even know for example, how many stars have planets, and we certainly do not know how likely it is that life will arise naturally, given the right conditions. However, when we look at the 100 billion stars in our galaxy [the Milky Way], and 100 billion galaxies in the observable Universe, it seems inconceivable that at least one of these planets does not have a life form on it; in fact, the best educated guess we can make using the little that we do know about the conditions for carbon-based life, leads us to estimate that perhaps one in 100,000 stars might have a life-bearing planet orbiting it. That means that our nearest neighbors are perhaps 1000 light years away, which is almost next door in astronomical terms.

D.

An alien civilization could choose many different ways of sending information across the galaxy, but many of these either require too much energy, or else are severely attenuated while traversing the vast distances across the galaxy. It turns out that, for a given amount of transmitted power, radio waves in the

invention by showing that its intricate, and systematic, patterning could not be the product of human reason alone but must have been the creation of God.

frequency range 1000 to 3000 MHz travel the greatest distance, and so all searches to date have concentrated on looking for radio waves in this frequency range. So far there have been a number of searches by various groups around the world, including Australian searches using the radio telescope at Parkes, New South Wales. Until now there have not been any detections from the few hundred stars which have been searched. The scale of the searches has been increased dramatically since 1992, when the US Congress voted NASA \$10 million per year for ten years to conduct a thorough search for extraterrestrial life. Much of the money in this project is being spent on developing the special hardware needed to search many frequencies at once. The project has two parts. One part is a targeted search using the world's largest radio telescopes. The American-operated telescope in Arecibo. Puerto Rico and the French telescope in Nancy in France. This part of the project is searching the nearest 1000 likely stars with a high sensibility for signals in the frequency range 1000 to 3000 MHz. The other part of the project is an undirected search which is monitoring all of the space with a lower one using the smaller antennas of NASA's Deep Space Network.

E

There is considerable debate over how we should react if we detect a signal from an alien civilization. Everybody agrees that we should not reply immediately. Quite apart from the impracticality of sending a reply over such large distances at short notice, it raises a host of ethical questions that would have to be addressed by the global community before any reply could be sent. Would the human race face culture shock if faced with a superior and much older civilization? Luckily, there is no urgency about this. The stars being searched are hundreds of light years away, so it takes hundreds of years for their signal to reach us, and a further few hundred years for our reply to reach them. It is not important, then, if there's a delay of a few years, or decades, while the human race debates the question of whether to reply and perhaps carefully drafts a reply.

Source: <https://mini-ielts.com>, *The Search for Extraterrestrial Intelligence*

Exercise 2

Questions 1 - 3 Look at the following statements and the list of people below.

Match each statement with the correct person.

1. Felt that historical analysis was irrelevant.
2. Believed that it was impossible for all languages to be explained with one system.
3. Felt that human language was Divine.

List of People

- A. Condillac
- B. Boas
- C. Herder
- D. Sussmilch
- E. De Saussure

The Origin of Languages

The question of the origin of language is one that has been raised and discussed repeatedly at least since the eighteenth century. Before that it was supposed that language must have been part of God's gift to Adam. There was a tradition of linguistic inquiry that sought to discover what original tongue it was that Adam spoke, but the question of how he came to be able to speak at all was not really raised.

In the eighteenth century, especially in France, the idea that human characteristics could be accounted for by nature rather than by Divine gift was widely discussed, and such figures as Rousseau, Condillac and Maupertuis, among others, attempted to show that language could have had natural beginnings or could have been invented by natural reason. There were Some who countered this - for example, the Lutheran pastor Sussmilch who, in 1756, attempted to refute the arguments of Maupertuis that language was an invention by showing that its intricate, and systematic, patterning could not be the product of human reason alone but must have been the creation of God.

However, it was the German philosopher Herder who in 1772 won the competition set by the Berlin Academy of Sciences with an essay that refuted all arguments for a Divine origin of language. For a long time his statement was considered to have settled the question.

Furthermore, as historical work proceeded and more and more languages were carefully examined, it appeared that the changes languages undergo with time, though to some degree lawful, were neither consistent nor progressive. It was not found, for instance, that Older languages were simpler than contemporary languages, nor was it found possible to show that any of the various types of language proposed-such as 'isolating', 'agglutinating or inflecting'- represented earlier or later stages in language development. In other words, changes that languages were found to undergo with time were manifestly not to be accounted for by any clear process of evolution. The practitioners of historical linguistics, accordingly abandoned any quest for a general theory of language development, and they gave up that their work could throw light on language origins.

By the end of the first decade of the twentieth century, the emphasis in linguistics had shifted from historical analysis to the analysis of the synchronic structure of languages. De Saussure's understanding of the argument that historical (diachronic) analysis was not relevant for understanding the organization of a given linguistic system when considered in its use by a community of Speakers, had an important influence. In addition, Franz Boas and his pupil Edward Sapir, working in North America, showed that the languages of the Native Americans had to be understood in their own terms, since they had grammars and sound systems that could not be comprehended in terms of systems derived from European languages.

This work helped to show that the languages of so-called 'primitive' peoples were just as complicated as the most sophisticated and modern of European languages, and that there was no evidence for the preservation of earlier forms of language. The development of methods for describing the diversity of human languages became a major preoccupation for linguistics, and questions about the origin of the human capacity for language, or of how languages had evolved from earlier forms to those of the present, seemed less and less relevant. Speculation about language origins thus appeared worthless,

for there was no evidence on which it could be based. Anyone's guess was as good as another's. The wastepaper baskets of London were perhaps, after all, the best destination for such imaginings.

Source: <https://en.wikipedia.org>, *Origin of Language*

Practice Exercises

Practice 1

Which paragraph contains the following information?

Write the correct letter, A–F, in boxes 14–17 on your answer sheet.

NB You may use any letter more than once.

- 14** the location of the first test site
- 15** a way of bringing the power produced on one site back into Britain
- 16** a reference to a previous attempt by Britain to find an alternative source of energy
- 17** mention of the possibility of applying technology from another industry

Tidal power

A

Operating on the same principle as wind turbines, the power in sea turbines comes from tidal currents which turn blades similar to ships' propellers, but, unlike wind, the tides are predictable and the power input is constant. The technology raises the prospect of Britain becoming self-sufficient in renewable energy and drastically reducing its carbon dioxide emissions. If tide, wind and wave power are all developed, Britain would be able to close gas, coal and nuclear power plants and export renewable power to other parts of Europe. Unlike wind power, which Britain originally developed and then abandoned for 20 years allowing the Dutch to make it a major industry, undersea turbines could become a big export earner to island nations such as Japan and New Zealand.

B

Tidal sites have already been identified that will produce one sixth or more of the UK's power - and at prices competitive with modern gas turbines and undercutting those of the already ailing nuclear industry. One site alone, the Pentland Firth, between Orkney and mainland Scotland, could produce 10% of the country's electricity with banks of turbines under the sea, and another at Alderney in the Channel Islands three times the 1,200 megawatts of Britain's largest and newest nuclear plant, Sizewell B, in Suffolk. Other sites identified include the Bristol Channel and the west coast of Scotland, particularly the channel between Campbeltown and Northern Ireland.

C

Work on designs for the new turbine blades and sites are well advanced at the University of Southampton's sustainable energy research group. The first station is expected to be installed off Lynmouth in Devon shortly to test the technology in a venture jointly funded by the department of Trade and Industry and the European Union. AbuBakr Bahaj, in charge of the Southampton research, said: The prospects for energy from tidal currents are far better than from wind because the flows of water are predictable and constant. The technology for dealing with the hostile saline environment under the sea has been developed in the North Sea oil industry and much is already known about turbine blade design, because of wind power and ship propellers. There are a few technical difficulties, but I believe in the next five to ten years we will be installing commercial marine turbine farms.' Southampton has been awarded £215,000 over three years to develop the turbines and is working with Marine Current Turbines, a subsidiary of IT power, on the Lynmouth project. EU research has now identified 106 potential sites for tidal power, 80% round the coasts of Britain. The best sites are between islands or around heavily indented coasts where there are strong tidal currents.

D

A marine turbine blade needs to be only one third of the size of a wind generator to produce three times as much power. The blades will be about 20 metres in diameter, so around 30 metres of water is required. Unlike wind power, there are unlikely to be environmental objections. Fish and other creatures are thought unlikely to be at risk from the relatively slow-turning

blades. Each turbine will be mounted on a tower which will connect to the national power supply grid via underwater cables. The towers will stick out of the water and be lit, to warn shipping, and also be designed to be lifted out of the water for maintenance and to clean seaweed from the blades.

E

Dr Bahaj has done most work on the Alderney site, where there are powerful currents. The single undersea turbine farm would produce far more power than needed for the Channel Islands and most would be fed into the French Grid and be re-imported into Britain via the cable under the Channel.

F

One technical difficulty is cavitation, where low pressure behind a turning blade causes air bubbles. These can cause vibration and damage the blades of the turbines. Dr Bahaj said: 'We have to test a number of blade types to avoid this happening or at least make sure it does not damage the turbines or reduce performance. Another slight concern is submerged debris floating into the blades. So far we do not know how much of a problem it might be. We will have to make the turbines robust because the sea is a hostile environment, but all the signs that we can do it are good

Explanation of Q. No.14:

Apply The Tips As Taught Above:

14. The location of the first test site

Keywords: first test site

In paragraph C, the writer says that "The first station is expected to be installed off Lynmouth in Devon shortly to test the technology in a venture jointly funded by the department of Trade and Industry and the European Union."

– site=station

=>ANSWER: C

Source: Cambridge Book 9

Practice 2

Which paragraph contains the following information?

Write the correct letter, A–F, in boxes 27–32 on your answer sheet.

- 27** an explanation of the factors affecting the transmission of information
- 28** an example of how unnecessary information can be omitted
- 29** a reference to Shannon's attitude to fame
- 30** details of a machine capable of interpreting incomplete information
- 31** a detailed account of an incident involving information theory
- 32** a reference to what Shannon initially intended to achieve in his research

Information theory the big idea

A

In April 2002 an event took place which demonstrated one of the many applications of information theory. The space probe, Voyager I, launched in 1977, had sent back spectacular images of Jupiter and Saturn and then soared out of the Solar System on a one-way mission to the stars. After 25 years of exposure to the freezing temperatures of deep space, the probe was beginning to show its age. Sensors and circuits were on the brink of failing and NASA experts realised that they had to do something or lose contact with their probe forever. The solution was to get a message to Voyager I to instruct it to use spares to change the failing parts. With the probe 12 billion kilometres from Earth, this was not an easy task. By means of a radio dish belonging to NASA's Deep Space Network, the message was sent out into the depths of space. Even travelling at the speed of light, it took over 11 hours to reach its target, far beyond the orbit of Pluto. Yet, incredibly, the little probe managed to hear the faint call from its home planet, and successfully made the switchover.

B

It was the longest-distance repair job in history, and a triumph for the NASA engineers. But it also highlighted the astonishing power of the techniques developed by American communications engineer Claude Shannon, who had

died just a year earlier. Born in 1916 in Petoskey, Michigan, Shannon showed an early talent for maths and for building gadgets, and made breakthroughs in the foundations of computer technology when still a student. While at Bell Laboratories, Shannon developed information theory, but shunned the resulting acclaim. In the 1940s, he single-handedly created an entire science of communication which has since inveigled its way into a host of applications, from DVDs to satellite communications to bar codes - any area, in short, where data has to be conveyed rapidly yet accurately.

C

This all seems light years away from the down-to-earth uses Shannon originally had for his work, which began when he was a 22-year-old graduate engineering student at the prestigious Massachusetts Institute of Technology in 1939. He set out with an apparently simple aim: to pin down the precise meaning of the concept of 'information'. The most basic form of information, Shannon argued, is whether something is true or false - which can be captured in the binary unit, or 'bit', of the form 1 or 0. Having identified this fundamental unit, Shannon set about defining otherwise vague ideas about information and how to transmit it from place to place. In the process he discovered something surprising: it is always possible to guarantee information will get through random interference - 'noise' - intact.

D

Noise usually means unwanted sounds which interfere with genuine information. Information theory generalises this idea via theorems that capture the effects of noise with mathematical precision. In particular, Shannon showed that noise sets a limit on the rate at which information can pass along communication channels while remaining error-free. This rate depends on the relative strengths of the signal and noise travelling down the communication channel, and on its capacity (its 'bandwidth'). The resulting limit, given in units of bits per second, is the absolute maximum rate of error-free communication given signal strength and noise level. The trick, Shannon showed, is to find ways of packaging up - 'coding' - information to cope with the ravages of noise, while staying within the information-carrying capacity - 'bandwidth' - of the communication system being used.

E

Over the years scientists have devised many such coding methods, and they have proved crucial in many technological feats. The Voyager spacecraft transmitted data using codes which added one extra bit for every single bit of information; the result was an error rate of just one bit in 10,000 - and stunningly clear pictures of the planets. Other codes have become part of everyday life - such as the Universal Product Code, or bar code, which uses a simple error-detecting system that ensures supermarket check-out lasers can read the price even on, say, a crumpled bag of crisps. As recently as 1993, engineers made a major breakthrough by discovering so-called turbo codes - which come very close to Shannon's ultimate limit for the maximum rate that data can be transmitted reliably, and now play a key role in the mobile videophone revolution.

F

Shannon also laid the foundations of more efficient ways of storing information, by stripping out superfluous ('redundant') bits from data which contributed little real information. As mobile phone text messages like 'I CN C U' show, it is often possible to leave out a lot of data without losing much meaning. As with error correction, however, there's a limit beyond which messages become too ambiguous. Shannon showed how to calculate this limit, opening the way to the design of compression methods that cram maximum information into the minimum space.

Source: Cambridge Book 9

Practice 3

Reading Passage has nine paragraphs, A-I.

Which paragraph contains the following information?

Write the correct letter, A-I, in boxes 1-5 on your answer sheet.

NB You may use any letter more than once.

1. a description of the substance responsible for the red colouration of leave

2. the reason why trees drop their leaves in autumn
3. some evidence to confirm a theory about the purpose of the red leaves
4. an explanation of the function of chlorophyll
5. a suggestion that the red colouration in leaves could serve as a warning signal

Autumn leaves

A One of the most captivating natural events of the year in many areas throughout North America is the turning of the leaves in the fall. The colours are magnificent, but the question of exactly why some trees turn yellow or orange, and others red or purple, is something which has long puzzled scientists.

B Summer leaves are green because they are full of chlorophyll, the molecule that captures sunlight converts that energy into new building materials for the tree. As fall approaches in the northern hemisphere, the amount of solar energy available declines considerably. For many trees – evergreen conifers being an exception – the best strategy is to abandon photosynthesis* until the spring. So rather than maintaining the now redundant leaves throughout the winter, the tree saves its precious resources and discards them. But before letting its leaves go, the tree dismantles their chlorophyll molecules and ships their valuable nitrogen back into the twigs. As chlorophyll is depleted, other colours that have been dominated by it throughout the summer begin to be revealed. This unmasking explains the autumn colours of yellow and orange, but not the brilliant reds and purples of trees such as the maple or sumac.

C The source of the red is widely known: it is created by anthocyanins, water-soluble plant pigments reflecting the red to blue range of the visible spectrum. They belong to a class of sugar-based chemical compounds also known as flavonoids. What's puzzling is that anthocyanins are actually newly minted, made in the leaves at the same time as the tree is preparing to drop them. But it is hard to make sense of the manufacture of anthocyanins – why should a tree bother making new chemicals in its leaves when it's already scrambling to withdraw and preserve the ones already there?

D Some theories about anthocyanins have argued that they might act as a chemical defence against attacks by insects or fungi, or that they might attract

fruit-eating birds or increase a leaf's tolerance to freezing. However there are problems with each of these theories, including the fact that leaves are red for such a relatively short period that the expense of energy needed to manufacture the anthocyanins would outweigh any anti-fungal or anti-herbivore activity achieved.* photosynthesis: the production of new material from sunlight, water and carbon dioxide.

E It has also been proposed that trees may produce vivid red colours to convince herbivorous insects that they are healthy and robust and would be easily able to mount chemical defences against infestation. If insects paid attention to such advertisements, they might be prompted to lay their eggs on a duller, and presumably less resistant host. The flaw in this theory lies in the lack of proof to support it. No one has as yet ascertained whether more robust trees sport the brightest leaves, or whether insects make choices according to colour intensity.

F Perhaps the most plausible suggestion as to why leaves would go to the trouble of making anthocyanins when they're busy packing up for the winter is the theory known as the 'light screen' hypothesis. It sounds paradoxical, because the idea behind this hypothesis is that the red pigment is made in autumn leaves to protect chlorophyll, the light-absorbing chemical, from too much light. Why does chlorophyll need protection when it is the natural world's supreme light absorber? Why protect chlorophyll at a time when the tree is breaking it down to salvage as much of it as possible?

G Chlorophyll, although exquisitely evolved to capture the energy of sunlight, can sometimes be overwhelmed by it, especially in situations of drought, low temperatures, or nutrient deficiency. Moreover, the problem of oversensitivity to light is even more acute in the fall, when the leaf is busy preparing for winter by dismantling its internal machinery. The energy absorbed by the chlorophyll molecules of the unstable autumn leaf is not immediately channelled into useful products and processes, as it would be in an intact summer leaf. The weakened fall leaf then becomes vulnerable to the highly destructive effects of the oxygen created by the excited chlorophyll molecules.

H Even if you had never suspected that this is what was going on when leaves turn red, there are clues out there. One is straightforward: on many trees, the leaves that are the reddest are those on the side of the tree which gets the most

sun. Not only that, but the red is brighter on the upper side of the leaf. It has also been recognised for decades that the best conditions for intense red colours are dry, sunny days and cool nights, conditions that nicely match those that make leaves susceptible to excess light. And finally, trees such as maples usually get much redder the more north you travel in the northern hemisphere. It's colder there, they're more stressed, their chlorophyll is more sensitive and it needs more sunblock.

I What is still not fully understood, however, is why some trees resort to producing red pigments while others don't bother, and simply reveal their orange or yellow hues. Do these trees have other means at their disposal to prevent overexposure to light in autumn? Their story, though not as spectacular to the eye, will surely turn out to be as subtle and as complex.

Source: Cambridge Book 10

Practice 4

Questions 23–26

Reading Passage 2 has eight sections, **A–H**.

Which section contains the following information?

Write the correct letter, **A–H**, in boxes 23–26 on your answer sheet.

- 23 a mention of how rational thinking enabled someone to achieve physical goals
- 24 an account of how someone overcame a sad experience
- 25 a description of how someone decided to rethink their academic career path
- 26 an example of how someone risked his career out of a sense of duty

Second nature

A Psychologists have long held that a person's character cannot undergo a transformation in any meaningful way and that the key traits of personality are determined at a very young age. However, researchers have begun looking more closely at ways we can change. Positive psychologists have

identified 24 qualities we admire, such as loyalty and kindness, and are studying them to find out why they come so naturally to some people. What they're discovering is that many of these qualities amount to habitual behaviour that determines the way we respond to the world. The good news is that all this can be learned.

Some qualities are less challenging to develop than others, optimism being one of them. However, developing qualities requires mastering a range of skills which are diverse and sometimes surprising. For example, to bring more joy and passion into your life, you must be open to experiencing negative emotions. Cultivating such qualities will help you realise your full potential.

B 'The evidence is good that most personality traits can be altered,' says Christopher Peterson, professor of psychology at the University of Michigan, who cites himself as an example. Inherently introverted, he realised early on that as an academic, his reticence would prove disastrous in the lecture hall. So he learned to be more outgoing and to entertain his classes. 'Now my extroverted behaviour is spontaneous,' he says.

C David Fajgenbaum had to make a similar transition. He was preparing for university, when he had an accident that put an end to his sports career. On campus, he quickly found that beyond ordinary counselling, the university had no services for students who were undergoing physical rehabilitation and suffering from depression like him. He therefore launched a support group to help others in similar situations. He took action despite his own pain - a typical response of an optimist.

D Suzanne Segerstrom, professor of psychology at the University of Kentucky, believes that the key to increasing optimism is through cultivating optimistic behaviour, rather than positive thinking. She recommends you train yourself to pay attention to good fortune by writing down three positive things that come about each day. This will help you convince yourself that favourable outcomes actually happen all the time, making it easier to begin taking action.

E You can recognise a person who is passionate about a pursuit by the way they are so strongly involved in it. Tanya Streeter's passion is freediving - the sport of plunging deep into the water without tanks or other breathing equipment. Beginning in 1998, she set nine world records and can hold her breath for six

minutes. The physical stamina required for this sport is intense but the psychological demands are even more overwhelming. Streeter learned to untangle her fears from her judgment of what her body and mind could do. 'In my career as a competitive freediver, there was a limit to what I could do - but it wasn't anywhere near what I thought it was/ she says.

F Finding a pursuit that excites you can improve anyone's life. The secret about consuming passions, though, according to psychologist Paul Silvia of the University of North Carolina, is that 'they require discipline, hard work and ability, which is why they are so rewarding.' Psychologist Todd Kashdan has this advice for those people taking up a new passion: 'As a newcomer, you also have to tolerate and laugh at your own ignorance. You must be willing to accept the negative feelings that come your way,' he says.

G In 2004, physician-scientist Mauro Zappaterra began his PhD research at Harvard Medical School. Unfortunately, he was miserable as his research wasn't compatible with his curiosity about healing. He finally took a break and during eight months in Santa Fe, Zappaterra learned about alternative healing techniques not taught at Harvard. When he got back, he switched labs to study how cerebrospinal fluid nourishes the developing nervous system. He also vowed to look for the joy in everything, including failure, as this could help him learn about his research and himself.

One thing that can hold joy back is a person's concentration on avoiding failure rather than their looking forward to doing something well. 'Focusing on being safe might get in the way of you reaching your goals,' explains Kashdan. For example, are you hoping to get through a business lunch without embarrassing yourself, or are you thinking about how fascinating the conversation might be?

H Usually, we think of courage in physical terms but ordinary life demands something else. For marketing executive Kenneth Pedeleose, it meant speaking out against something he thought was ethically wrong. The new manager was intimidating staff so Pedeleose carefully recorded each instance of bullying and eventually took the evidence to a senior director, knowing his own job security would be threatened. Eventually the manager was the one to go. According to Cynthia Pury, a psychologist at Clemson University, Pedeleose's story proves the point that courage is not motivated by fearlessness, but by moral obligation.

Pury also believes that people can acquire courage. Many of her students said that faced with a risky situation, they first tried to calm themselves down, then looked for a way to mitigate the danger, just as Pedeleose did by documenting his allegations.

Over the long term, picking up a new character trait may help you move toward being the person you want to be. And in the short term, the effort itself could be surprisingly rewarding, a kind of internal adventure.

Source: Cambridge Book 10

Practice 5

Which paragraph contains the following information?

Write the correct letter, A–H, in boxes 27–29 on your answer sheet.

- 27 mention of a geo-engineering project based on an earlier natural phenomenon
- 28 an example of a successful use of geo-engineering
- 29 a common definition of geo-engineering

Reducing the effects of climate change

A

Such is our dependence on fossil fuels, and such is the volume of carbon dioxide already released into the atmosphere, that many experts agree that significant global warming is now inevitable. They believe that the best we can do is keep it at a reasonable level, and at present the only serious option for doing this is cutting back on our carbon emissions. But while a few countries are making major strides in this regard, the majority are having great difficulty even stemming the rate of increase, let alone reversing it. Consequently, an increasing number of scientists are beginning to explore the alternative of geo-engineering — a term which generally refers to the intentional large-scale manipulation of the environment. According to its proponents, geo-engineering is the equivalent of a backup generator: if Plan A - reducing our dependence on fossil fuels - fails, we require a Plan B, employing grand schemes to slow down or reverse the process of global warming.

B

Geo-engineering has been shown to work, at least on a small localised scale. For decades, MayDay parades in Moscow have taken place under clear blue skies, aircraft having deposited dry ice, silver iodide and cement powder to disperse clouds. Many of the schemes now suggested look to do the opposite, and reduce the amount of sunlight reaching the planet. The most eye-catching idea of all is suggested by Professor Roger Angel of the University of Arizona. His scheme would employ up to 16 trillion minute spacecraft, each weighing about one gram, to form a transparent, sunlight-refracting sunshade in an orbit 1.5 million km above the Earth. This could, argues Angel, reduce the amount of light reaching the Earth by two per cent.

C

The majority of geo-engineering projects so far carried out — which include planting forests in deserts and depositing iron in the ocean to stimulate the growth of algae - have focused on achieving a general cooling of the Earth. But some look specifically at reversing the melting at the poles, particularly the Arctic. The reasoning is that if you replenish the ice sheets and frozen waters of the high latitudes, more light will be reflected back into space, reducing the warming of the oceans and atmosphere.

D

The concept of releasing aerosol sprays into the stratosphere above the Arctic has been proposed by several scientists. This would involve using sulphur or hydrogen sulphide aerosols so that sulphur dioxide would form clouds, which would, in turn, lead to a global dimming. The idea is modelled on historic volcanic explosions, such as that of Mount Pinatubo in the Philippines in 1991, which led to a short-term cooling of global temperatures by 0.5 °C.

Scientists have also scrutinised whether it's possible to preserve the ice sheets of Greenland with reinforced high-tension cables, preventing icebergs from moving into the sea. Meanwhile in the Russian Arctic, geo-engineering plans include the planting of millions of birch trees. Whereas the -regions native evergreen pines shade the snow and absorb radiation, birches would shed their leaves in winter, thus enabling radiation to be reflected by the snow. Re-routing Russian rivers to increase cold water flow to ice-forming areas could also be used to slow down warming, say some climate scientists.

E

But will such schemes ever be implemented? Generally speaking, those who are most cautious about geo-engineering are the scientists involved in the research. Angel says that his plan is 'no substitute for developing renewable energy: the only permanent solution'.

And Dr Phil Rasch of the US-based Pacific Northwest National Laboratory is equally guarded about the role of geo-engineering: 'I think all of us agree that if we were to end geo-engineering on a given day, then the planet would return to its pre-engineered condition very rapidly, and probably within ten to twenty years. That's certainly something to worry about.'

F

The US National Center for Atmospheric Research has already suggested that the proposal to inject sulphur into the atmosphere might affect rainfall patterns across the tropics and the Southern Ocean. 'Geo-engineering plans to inject stratospheric aerosols or to seed clouds would act to cool the planet, and act to increase the extent of sea ice,' says Rasch. 'But all the models suggest some impact on the distribution of precipitation.'

G

A further risk with geo-engineering projects is that you can "overshoot Y", says Dr Dan Hunt, from the University of Bristol's School of Geophysical Sciences, who has studied the likely impacts of the sunshade and aerosol schemes on the climate. 'You may bring global temperatures back to pre-industrial levels, but the risk is that the poles will still be warmer than they should be and the tropics will be cooler than before industrialisation.' To avoid such a scenario," Hunt says, "Angel's project would have to operate at half strength; all of which reinforces his view that the best option is to avoid the need for geo-engineering altogether."

H

The main reason why geo-engineering is supported by many in the scientific community is that most researchers have little faith in the ability of politicians to agree - and then bring in — the necessary carbon cuts. Even leading conservation organisations see the value of investigating the potential of geo-engineering. According to Dr Martin Sommerkorn, climate change advisor

for the World Wildlife Fund's International Arctic Programme, 'Human-induced climate change has brought humanity to a position where we shouldn't exclude thinking thoroughly about this topic and its possibilities.'

Source: Cambridge Book 11

Practice 6

Look at the following statements (Questions 5–8) and the list of dates below.

Match each statement with the correct date, A–G.

Write the correct letter, A–G, in boxes 5–8 on your answer sheet.

- 5 A search for the *Mary Rose* was launched.
- 6 One person's exploration of the *Mary Rose* site stopped.
- 7 It was agreed that the hull of the *Mary Rose* should be raised.
- 8 The site of the *Mary Rose* was found by chance.

List of Dates			
A	1836	E	1971
B	1840	F	1979
C	1965	G	1982
D	1967		

Raising the Mary Rose

On 19 July 1545, English and French fleets were engaged in a sea battle off the coast of southern England in the area of water called the Solent, between Portsmouth and the Isle of Wight.

Among the English vessels was a warship by the name of *Mary Rose*. Built in Portsmouth some 35 years earlier, she had had a long and successful fighting career, and was a favourite of King Henry VIII. Accounts of what happened to the ship vary: while witnesses agree that she was not hit by the French, some maintain that she was outdated, overladen and sailing too low in the water, others that she was mishandled by undisciplined crew.

What is undisputed, however, is that the *Mary Rose* sank into the Solent that

day, taking at least 500 men with her. After the battle, attempts were made to recover the ship, but these failed.

The Mary Rose came to rest on the seabed, lying on her starboard (right) side at an angle of approximately 60 degrees. The hull (the body of the ship) acted as a trap for the sand and mud carried by Solent currents. As a result, the starboard side filled rapidly, leaving the exposed port (left) side to be eroded by marine organisms and mechanical degradation. Because of the way the ship sank, nearly all of the starboard half survived intact.

During the seventeenth and eighteenth centuries, the entire site became covered with a layer of hard grey clay, which minimised further erosion.

Then, on 16 June 1836, some fishermen in the Solent found that their equipment was caught on an underwater obstruction, which turned out to be the Mary Rose. Diver John Deane happened to be exploring another sunken ship nearby, and the fishermen approached him, asking him to free their gear. Deane dived down, and found the equipment caught on a timber protruding slightly from the seabed. Exploring further, he uncovered several other timbers and a bronze gun. Deane continued diving on the site intermittently until 1840, recovering several more guns, two bows, various timbers, part of a pump and various other small finds.

The Mary Rose then faded into obscurity for another hundred years. But in 1965, military historian and amateur diver Alexander McKee, in conjunction with the British Sub-Aqua Club, initiated a project called 'Solent Ships'. While on paper this was a plan to examine a number of known wrecks in the Solent, what McKee really hoped for was to find the Mary Rose. Ordinary search techniques proved unsatisfactory, so McKee entered into collaboration with Harold E. Edgerton, professor of electrical engineering at the Massachusetts Institute of Technology.

In 1967, Edgerton's side-scan sonar systems revealed a large, unusually shaped object, which McKee believed was the Mary Rose. Further excavations revealed stray pieces of timber and an iron gun. But the climax to the operation came when, on 5 May 1971, part of the ship's frame was uncovered. McKee and his team now knew for certain that they had found the wreck, but were as yet unaware that it also housed a treasure trove of beautifully preserved artefacts.

Interest in the project grew, and in 1979, The Mary Rose Trust was formed, with Prince Charles as its President and Dr Margaret Rule its Archaeological Director. The decision whether or not to salvage the wreck was not an easy one, although an excavation in 1978 had shown that it might be possible to raise the hull. While the original aim was to raise the hull if at all feasible, the operation was not given the go-ahead until January 1982, when all the necessary information was available.

An important factor in trying to salvage the Mary Rose was that the remaining hull was an open shell. This led to an important decision being taken: namely to carry out the lifting operation in three very distinct stages. The hull was attached to a lifting frame via a network of bolts and lifting wires. The problem of the hull being sucked back downwards into the mud was overcome by using 12 hydraulic jacks. These raised it a few centimetres over a period of several days, as the lifting frame rose slowly up its four legs. It was only when the hull was hanging freely from the lifting frame, clear of the seabed and the suction effect of the surrounding mud, that the salvage operation progressed to the second stage. In this stage, the lifting frame was fixed to a hook attached to a crane, and the hull was lifted completely clear of the seabed and transferred underwater into the lifting cradle. This required precise positioning to locate the legs into the stabbing guides of the lifting cradle. The lifting cradle was designed to fit the hull just in accordance with archaeological survey drawings, and was fitted with air bags to provide additional cushioning for the hull's delicate timber framework. The third and final stage was to lift the entire structure into the air, by which time the hull was also supported from below. Finally, on 11 October 1982, millions of people around the world held their breath as the timber skeleton of the Mary Rose was lifted clear of the water, ready to be returned home to Portsmouth.

Source: Cambridge Book 11

Practice 7

Which paragraph contains the following information?

Write the correct letter, A–I, in boxes 1–3 on your answer sheet.

- 1 a reference to characteristics that only apply to food production
- 2 a reference to challenges faced only by farmers in certain parts of the world
- 3 a reference to difficulties in bringing about co-operation between farmers

The risk agriculture faces in developing countries

A

Two things distinguish food production from all other productive activities: first, every single person needs food each day and has a right to it; and second, it is hugely dependent on nature. These two unique aspects, one political, the other natural, make food production highly vulnerable and different from any other business. At the same time, cultural values are highly entrenched in food and agricultural systems worldwide.

B

Farmers everywhere face major risks; including extreme weather, long-term climate change, and price volatility in input and product markets. However, smallholder farmers in developing countries must in addition deal with adverse environments, both natural, in terms of soil quality, rainfall, etc. and human, in terms of infrastructure, financial systems, markets, knowledge and technology. Counter-intuitively, hunger is prevalent among many smallholder farmers in the developing world.

C

Participants in the online debate argued that our biggest challenge is to address the underlying causes of the agricultural system's inability to ensure sufficient food for all, and they identified as drivers of this problem our dependency on fossil fuels and unsupportive government policies.

D

On the question of mitigating the risks farmers face, most essayists called for greater state intervention.

In his essay, Kanayo F. Nwanze, President of the International Fund for Agricultural Development, argued that governments can significantly reduce risks for farmers by providing basic services like roads to get produce more efficiently to markets, or water and food storage facilities to reduce losses. Sophia Murphy, senior advisor to the Institute for Agriculture and Trade Policy, suggested that the procurement and holding of stocks by governments can also help mitigate wild swings in food prices by alleviating uncertainties about market supply.

E

Shenggen Fan, Director General of the International Food Policy Research Institute, held up social safety nets and public welfare programmes in Ethiopia, Brazil and Mexico as valuable ways to address poverty among farming families and reduce their vulnerability to agriculture shocks. However, some commentators responded that cash transfers to poor families do not necessarily translate into increased food security, as these programmes do not always strengthen food production or raise incomes.

Regarding state subsidies for agriculture, Rokeya Kabir, Executive Director of Bangladesh Nari Progati Sangha, commented in her essay that these 'have not compensated for the stranglehold exercised by private traders.

In fact, studies show that sixty percent of beneficiaries of subsidies are not poor, but rich landowners and non-farmer traders.

F

Nwanze, Murphy and Fan argued that private risk management tools, like private insurance, commodity futures markets, and rural finance can help small-scale producers mitigate risk and allow for investment in improvements. Kabir warned that financial support schemes often encourage the adoption of high-input agricultural practices, which in the medium term may raise production costs beyond the value of their harvests.

Murphy noted that when futures markets become excessively financialised they can contribute to short-term price volatility, which increases farmers' food insecurity. Many participants and commentators emphasised that greater transparency in markets is needed to mitigate the impact of volatility, and make evident whether adequate stocks and supplies are available. Others contended

that agribusiness companies should be held responsible for paying for negative side effects.

G

Many essayists mentioned climate change and its consequences for small-scale agriculture. Fan explained that in addition to reducing crop yields, climate change increases the magnitude and the frequency of extreme weather events, which increase smallholder vulnerability. The growing unpredictability of weather patterns increases farmers' difficulty in managing weather-related risks.

According to this author, one solution would be to develop crop varieties that are more resilient to new climate trends and extreme weather patterns. Accordingly, Pat Mooney, co-founder and executive director of the ETC Group, suggested that 'if we are to survive climate change, we must adopt policies that let peasants diversify the plant and animal species and varieties/breeds that make up our menus.

H

Some participating authors and commentators argued in favour of community-based and autonomous risk management strategies through collective action groups, co-operatives or producers' groups. Such groups enhance market opportunities for small-scale producers, reduce marketing costs and synchronise buying and selling with seasonal price conditions.

According to Murphy, 'collective action offers an important way for farmers to strengthen their political and economic bargaining power, and to reduce their business risks. One commentator, Giel Ton, warned that collective action does not come as a free good. It takes time, effort and money to organise, build trust and to experiment. Others, like Marcel Vernooij and Marcel Beukeboom, suggested that in order to 'apply what we already know', all stakeholders, including business, government, scientists and civil society, must work together, starting at the beginning of the value chain.

I

Some participants explained that market price volatility is often worsened by the presence of intermediary purchasers who, taking advantage of farmers' vulnerability, dictate prices. One commentator suggested farmers can gain

greater control over prices and minimise price volatility by selling directly to consumers.

Similarly, Sonali Bisht, founder and advisor to the Institute of Himalayan Environmental Research and Education (INHERE), India, wrote that copipunity-supported agriculture, where consumers invest in local farmers by subscription and guarantee producers a fair price, is a risk-sharing model worth more attention. Direct food distribution systems not only encourage small-scale agriculture but also give consumers more control over the food they consume, she wrote.

Source: Cambridge Book 12

Practice 8

Let's go bats

A

Bats have a problem: how to find their way around in the dark. They hunt at night, and cannot use light to help them find prey and avoid obstacles. You might say that this is a problem of their own making, one that they could avoid simply by changing their habits and hunting by day. But the daytime economy is already heavily exploited by other creatures such as birds. Given that there is a living to be made at night, and given that alternative daytime trades are thoroughly occupied, natural selection has favoured bats that make a go of the night-hunting trade. It is probable that the nocturnal trades go way back in the ancestry of all mammals. In the time when the dinosaurs dominated the daytime economy, our mammalian ancestors probably only managed to survive at all because they found ways of scraping a living at night. Only after the mysterious mass extinction of the dinosaurs about 65 million years ago were our ancestors able to emerge into the daylight in any substantial numbers.

B

Bats have an engineering problem: how to find their way and find their prey in the absence of light. Bats are not the only creatures to face this difficulty today. Obviously the night-flying insects that they prey on must find their way about

somehow. Deep-sea fish and whales have little or no light by day or by night. Fish and dolphins that live in extremely muddy water cannot see because, although there is light, it is obstructed and scattered by the dirt in the water. Plenty of other modern animals make their living in conditions where seeing is difficult or impossible.

C

Given the questions of how to manoeuvre in the dark, what solutions might an engineer consider? The first one that might occur to him is to manufacture light, to use a lantern or a searchlight. Fireflies and some fish (usually with the help of bacteria) have the power to manufacture their own light, but the process seems to consume a large amount of energy. Fireflies use their light for attracting mates. This doesn't require a prohibitive amount of energy: a male's tiny pinprick of light can be seen by a female from some distance on a dark night, since her eyes are exposed directly to the light source itself. However, using light to find one's own way around requires vastly more energy, since the eyes have to detect the tiny fraction of the light that bounces off each part of the scene. The light source must therefore be immensely brighter if it is to be used as a headlight to illuminate the path, than if it is to be used as a signal to others. In any event, whether or not the reason is the energy expense, it seems to be the case that, with the possible exception of some weird deep-sea fish, no animal apart from man uses manufactured light to find its way about.

D

What else might the engineer think of? Well, blind humans sometimes seem to have an uncanny sense of obstacles in their path. It has been given the name 'facial vision', because blind people have reported that it feels a bit like the sense of touch, on the face. One report tells of a totally blind boy who could ride his tricycle at good speed round the block near his home, using facial vision. Experiments showed that, in fact, facial vision is nothing to do with touch or the front of the face, although the sensation may be referred to the front of the face, like the referred pain in a phantom limb. The sensation of facial vision, it turns out, really goes in through the ears.

Blind people, without even being aware of the fact, are actually using echoes of their own footsteps and of other sounds, to sense the presence of obstacles.

Before this was discovered, engineers had already built instruments to exploit the principle, for example to measure the depth of the sea under a ship. After this technique had been invented, it was only a matter of time before weapons designers adapted it for the detection of submarines. Both sides in the Second World War relied heavily on these devices, under such codenames as Asdic (British) and Sonar (American), as well as Radar (American) or RDF (British), which uses radio echoes rather than sound echoes.

E

The Sonar and Radar pioneers didn't know it then, but all the world now knows that bats, or rather natural selection working on bats, had perfected the system tens of millions of years earlier; and their radar' achieves feats of detection and navigation that would strike an engineer dumb with admiration. It is technically incorrect to talk about bat 'radar', since they do not use radio waves. It is sonar. But the underlying mathematical theories of radar and sonar are very similar; and much of our scientific understanding of the details of what bats are doing has come from applying radar theory to them. The American zoologist Donald Griffin, who was largely responsible for the discovery of sonar in bats, coined the term 'écholocation' to cover both sonar and radar, whether used by animals or by human instruments.

Questions 1-5

Reading Passage has five paragraphs, A-E.

Which paragraph contains the following information?

Write the correct letter, A-E, in boxes 1-5 on your answer sheet.

NB You may use any letter more than once.

- 1) Examples of wildlife other than bats which do not rely on vision to navigate by.
- 2) How early mammals avoided dying out?
- 3 Why bats hunt in the dark?
- 4) How a particular discovery has helped our understanding of bats?
- 5) Early military uses of echolocation.

Source: Cambridge Book 7

Practice 9

Which paragraph contains the following information?

Write the correct letter, A–G, in boxes 14–17 on your answer sheet.

NB You may use any letter more than once.

- 14** a cost involved in purifying domestic water
- 15** the stages in the development of the farming industry
- 16** the term used to describe hidden costs
- 17** one effect of chemicals on water sources

The true of food

A

For more than forty years the cost of food has been rising. It has now reached a point where a growing number of people believe that it is far too high, and that bringing it down will be one of the great challenges of the twenty-first century. That cost, however, is not in immediate cash. In the West at least, most food is now far cheaper to buy in relative terms than it was in 1960.

The cost is in the collateral damage of the very methods of food production that have made the food cheaper: in the pollution of water, the enervation of soil, the destruction of wildlife, the harm to animal welfare and the threat to human health caused by modern industrial agriculture.

B

First mechanisation, then mass use of chemical fertilisers and pesticides, then monocultures, then battery rearing of livestock, and now genetic engineering - the onward march of intensive farming has seemed unstoppable in the last half-century, as the yields of produce have soared. But the damage it has caused has been colossal. In Britain, for example, many of our best-loved farmland birds, such as the skylark, the grey partridge, the lapwing and the corn bunting, have vanished from huge stretches of countryside, as have even more wild flowers and insects. This is a direct result of the way we have produced our food in the last four decades. Thousands of miles of hedgerows, thousands of ponds, have disappeared from the landscape. The faecal filth of salmon farming has driven

wild salmon from many of the sea lochs and rivers of Scotland. Natural soil fertility is dropping in many areas because of continuous industrial fertiliser and pesticide use, while the growth of algae is increasing in lakes because of the fertiliser run-off.

C

Put it all together and it looks like a battlefield, but consumers rarely make the connection at the dinner table. That is mainly because the costs of all this damage are what economists refer to as externalities: they are outside the main transaction, which is for example producing and selling a field of wheat, and are borne directly by neither producers nor consumers. To many, the costs may not even appear to be financial at all, but merely aesthetic - a terrible shame, but nothing to do with money. And anyway they, as consumers of food, certainly aren't paying for it, are they?

D

But the costs to society can actually be quantified and, when added up, can amount to staggering sums. A remarkable exercise in doing this has been carried out by one of the world's leading thinkers on the future of agriculture, Professor Jules Pretty, Director of the Centre for Environment and Society at the University of Essex. Professor Pretty and his colleagues calculated the externalities of British agriculture for one particular year. They added up the costs of repairing the damage it caused, and came up with a total figure of £2,343m. This is equivalent to £208 for every hectare of arable land and permanent pasture, almost as much again as the total government and EU spend on British farming in that year. And according to Professor Pretty, it was a conservative estimate.

E

The costs included: £120m for removal of pesticides; £16m for removal of nitrates; £55m for removal of phosphates and soil; £23m for the removal of the bug *Cryptosporidium* from drinking water by water companies; £125m for damage to wildlife habitats, hedgerows and dry stone walls; £1,113m from emissions of gases likely to contribute to climate change; £106m from soil erosion and organic carbon losses; £169m from food poisoning; and £607m from cattle disease. Professor Pretty draws a simple but memorable

conclusion from all this : our food bills are actually threefold. We are paying for our supposedly cheaper food in three separate ways: once over the counter, secondly through our taxes, which provide the enormous subsidies propping up modern intensive farming, and thirdly to clean up the mess that modern farming leaves behind.

F

So can the true cost of food be brought down? Breaking away from industrial agriculture as the solution to hunger may be very hard for some countries, but in Britain, where the immediate need to supply food is less urgent, and the costs and the damage of intensive farming have been clearly seen, it may be more feasible. The government needs to create sustainable, competitive and diverse farming and food sectors, which will contribute to a thriving and sustainable rural economy, and advance environmental, economic, health, and animal welfare goals.

Source: Cambridge Book 7

Practice 10

Which paragraph contains the following information?

Write the correct letter, A-F, in boxes 1-7 on your answer sheet.

NB You may use any letter more than once

1. a reference to the exchange of expertise between different sports
2. an explanation of how visual imaging is employed in investigations
3. a reason for narrowing the scope of research activity
4. how some AIS ideas have been reproduced
5. how obstacles to optimum achievement can be investigated
6. an overview of the funded support of athletes
7. how performance requirements are calculated before an event

Australia's sporting success

A

They play hard, they play often, and they play to win. Australian sports teams win more than their fair share of titles, demolishing rivals with seeming ease. How do they do it? A big part of the secret is an extensive and expensive network of sporting academies underpinned by science and medicine. At the Australian Institute of Sport (AIS), hundreds of youngsters and pros live and train under the eyes of coaches. Another body, the Australian Sports Commission (ASC), finances programmes of excellence in a total of 96 sports for thousands of sportsmen and women. Both provide intensive coaching, training facilities and nutritional advice.

B

Inside the academies, science takes centre stage. The AIS employs more than 100 sports scientists and doctors, and collaborates with scores of others in universities and research centres. AIS scientists work across a number of sports, applying skills learned in one - such as building muscle strength in golfers - to others, such as swimming and squash. They are backed up by technicians who design instruments to collect data from athletes. They all focus on one aim:

winning. 'We can't waste our time looking at ethereal scientific questions that don't help the coach work with an athlete and improve performance,' says Peter Pricker chief of science at AIS.

C

A lot of their work comes down to measurement - everything from the exact angle of a swimmer's dive to the second-by-second power output of a cyclist. This data is used to wring improvements out of athletes. The focus is on individuals, tweaking performances to squeeze an extra hundredth of a second here, an extra millimetre there. No gain is too slight to bother with. It's the tiny, gradual improvements that add up to world-beating results. To demonstrate how the system works, Bruce Mason at AIS shows off the prototype of a 3D analysis tool for studying swimmers. A wire-frame model of a champion swimmer slices through the water, her arms moving in slow motion. Looking side-on, Mason measures the distance between strokes. From above, he analyses how her spine swivels. When fully developed, this system will enable him to build a biomechanical profile for coaches to use to help budding swimmers. Mason's contribution to sport also includes the development of the SWAN (SWimming ANalysis) system now used in Australian national competitions. It collects images from digital cameras running at 50 frames a second and breaks down each part of a swimmer's performance into factors that can be analysed individually - stroke length, stroke frequency, average duration of each stroke, velocity, start, lap and finish times, and so on. At the end of each race, SWAN spits out data on each swimmer.

D

Take a look,' says Mason, pulling out a sheet of data. He points out the data on the swimmers in second and third place, which shows that the one who finished third actually swam faster. So why did he finish 35 hundredths of a second down? 'His turn times were 44 hundredths of a second behind the other guy,' says Mason. 'If he can improve on his turns, he can do much better.' This is the kind of accuracy that AIS scientists' research is bringing to a range of sports. With the Cooperative Research Centre for Micro Technology in Melbourne, they are developing unobtrusive sensors that will be embedded in

an athlete's clothes or running shoes to monitor heart rate, sweating, heat production or any other factor that might have an impact on an athlete's ability to run. There's more to it than simply measuring performance. Pricker gives the example of athletes who may be down with coughs and colds 11 or 12 times a year. After years of experimentation, AIS and the University of Newcastle in New South Wales developed a test that measures how much of the immune-system protein immunoglobulin A is present in athletes' saliva. If IgA levels suddenly fall below a certain level, training is eased or dropped altogether. Soon, IgA levels start rising again, and the danger passes. Since the tests were introduced, AIS athletes in all sports have been remarkably successful at staying healthy.

E

Using data is a complex business. Well before a championship, sports scientists and coaches start to prepare the athlete by developing a 'competition model', based on what they expect will be the winning times. 'You design the model to make that time,' says Mason. 'A start of this much, each free-swimming period has to be this fast, with a certain stroke frequency and stroke length, with turns done in these times.' All the training is then geared towards making the athlete hit those targets, both overall and for each segment of the race. Techniques like these have transformed Australia into arguably the world's most successful sporting nation.

F

Of course, there's nothing to stop other countries copying - and many have tried. Some years ago, the AIS unveiled coolant-lined jackets for endurance athletes. At the Atlanta Olympic Games in 1996, these sliced as much as two per cent off cyclists' and rowers' times. Now everyone uses them. The same has happened to the 'altitude tent', developed by AIS to replicate the effect of altitude training at sea level. But Australia's success story is about more than easily copied technological fixes, and up to now no nation has replicated its all-encompassing system.

True False Not Given/Yes No Not Given

These are the most challenging type questions that come up in IELTS Reading. You can find them in both Academic and GT IELTS Reading.

Definition:

You will be given informational statements. You must decide whether the information given in the Statement is true, false or not given as provided in the Reading Passage.

True	If the statement matches the information in the passage.
False	If the statement contradicts the information in the passage.
Not Given	If the information is not found in the passage.

Difference :

Yes/No/Not Given – Tested in argumentative passages that contain opinions, views or beliefs of the writer or other people who are mentioned.

True/False/Not Given – Tested in descriptive passages that contain factual information about a topic.

Strategies :

1. Read the question and Identify keywords in the statement.
2. Locate similar words in the passage by scanning.
3. Evaluate if they are same, synonyms, opposites or if there's no match.
4. Accordingly decide whether the statement is True, False or Not Given

Tips :

1. The statements mostly follow a chronological order. Once you find the first answer, proceed to the next sentence.

2. Watch out for those words that can slightly change the meaning of the sentence. For example, many, some, never, few, all, always, etc.
3. Don't waste too much time on one question. If you can't find one, mark it Not Given.
4. Don't get confused between False and Not Given.
This may sound obvious. But the statement does not necessarily have to be either True or False. At times the information may not be given in the passage.
5. Never try to answer based on your prior knowledge of the topic. The passage could be slightly different from your prior knowledge of the topic. DO NOT MAKE ASSUMPTIONS.
6. Paraphrasing: Sometimes, there are chances of getting paraphrased sentences. Look for the same, it becomes easy to find whether the sentence is True, False or Not Given.
7. Synonyms/Opposites: The best way to determine the sentences is just by looking at the keywords which can be either synonyms or antonyms.

IN-CLASS CONTENT

Exercise 1

Programmable plants

In electronics, even the most advanced computer is just a complex arrangement of simple, modular parts that control specific functions; the same integrated circuit might be found in an iPhone, or in an aircraft. Biologists are creating this same modularity in – wait for it – plants, by designing gene "circuits" that control specific plant characteristics – color, size, resistance to drought, you name it.

The relatively new, interdisciplinary field is synthetic biology – the design of genetic circuits, just like in electronics, that control different functions and can be easily placed in one organism to the next. Most of today's synthetic biologists work with simple microorganisms, like E. coli or yeast.

A CSU team led by June Medford, professor of biology, and Ashok Prasad, associate professor of chemical and biological engineering, is doing the same

thing, but in the much more complex biological world of plants.

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this statement

1. The scientists are using a technique from electronics to control specific plant properties.
2. The genetic circuits can be transplanted to different organisms.
3. E. Coli is a complex organism.

Source: <https://ielts-up.com/>, *Programmable plants*

Exercise 2

THAMES TUNNEL

When it opened in 1843 the Thames Tunnel was described as the Eighth Wonder of the World. People came from far and wide to see the first tunnel under a river. On the first day, fifty thousand people descended the staircase and paid a penny to walk through the tunnel. By the end of the first three months there were a million people, or half the population of London. This was the most successful visitor attraction in the world. In the age of sail and horse-drawn coaches, people came long distances and bought souvenirs and listened to the entertainment in the cross-tunnel arches. The idea, of course, was not entertainment but to move cargo and turn a profit.

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this statement

1. People were drawn from all over to see the Thames Tunnel.
2. People were able to travel by sea or land in those days.
3. Statues of the tunnel could be purchased as souvenirs.
4. The aim of building the tunnel was to make money as a tourist attraction.

Source: <https://ieltsliz.com>, *THAMES TUNNEL*

Exercise 3

Making sense of scent

With every whiff you take as you walk by a bakery, a cloud of chemicals comes swirling up your nose. Identifying the smell as freshly baked bread is a complicated process. But, compared to the other senses, the sense of smell is often underappreciated.

In a survey of 7,000 young people around the world, about half of those between the age of 16 and 30 said that they would rather lose their sense of smell than give up access to technology like laptops or cell phones.

We're not that acutely aware of our use of olfaction in daily living. In fact, mammals have about a thousand genes that code for odor reception. And even though humans have far fewer active odor receptor genes, 5 percent of our DNA is devoted to olfaction, a fact that emphasizes how important our sense of smell is.

Smell begins at the back of the nose, where millions of sensory neurons lie in a strip of tissue called the olfactory epithelium. Molecules of odorants pass through the superior nasal concha of the nasal passages and come down on the epithelium. The tips of the epithelium cells contain proteins called receptors that bind odor molecules. The receptors are like locks and the keys to open these locks are the odor molecules that float past, explains Leslie Vosshall, a scientist who studies olfaction.

People have about 450 different types of olfactory receptors. (For comparison, dogs have about two times as many.) Each receptor can be activated by many different odor molecules, and each odor molecule can activate several different

types of receptors. However, the forces that bind receptors and odor molecules can vary greatly in strength, so that some interactions are better “fits” than others.

The complexity of receptors and their interactions with odor molecules are what allow us to detect a wide variety of smells. And what we think of as a single smell is actually a combination of many odor molecules acting on a variety of receptors, creating an intricate neural code that we can identify as the scent of a rose or freshly-cut grass.

This neural code begins with the nose’s sensory neurons. Once an odor molecule binds to a receptor, it initiates an electrical signal that travels from the sensory neurons to the olfactory bulb, a structure at the base of the forebrain that relays the signal to other brain areas for additional processing.

One of these areas is the piriform cortex, a collection of neurons located just behind the olfactory bulb that works to identify the smell. Smell information also goes to the thalamus, a structure that serves as a relay station for all of the sensory information coming into the brain. The thalamus transmits some of this smell information to the orbitofrontal cortex, where it can then be integrated with taste information. What we often attribute to the sense of taste is actually the result of this sensory integration.

Predictably, the more overlap there was between two types of mixtures, the harder they were to tell apart. After calculating how many of the mixtures the majority of people could tell apart, the researchers were able to predict how people would fare if presented with every possible mixture that could be created from the 128 different odor molecules. They used this data to estimate that the average person can detect at least one trillion different smells, a far cry from the previous estimate of 10,000.

This number is probably an underestimation of the true number of smells we can detect, said Vosshall, because there are far more than 128 different types of odor molecules in the world. And our olfaction is quite powerful compared to other mammals. For example, marine animals can detect only water-soluble odorants.

No longer should humans be considered poor smellers. “It’s time to give our sense of smell the recognition it deserves,” said Vosshall.

Questions 14-19

Do the following statements agree with the information given in Reading Passage 1?

In boxes 14-19 on your answer sheet, write

TRUE if the statement agrees with the information

FALSE if the statement contradicts the information

NOT GIVEN if there is no information on this

- 14. In general, olfaction and sense of taste are considered equally important.
- 15. About 7,000 young people around the world would prefer losing their sense of smell than access to laptops.
- 16. Odor reception is an integral function of all mammals.
- 17. Superior nasal concha is compared to a lock and odor molecules are like keys that are used to open it.
- 18. Cats have two times as many olfactory receptors as humans.
- 19. We are able to detect a lot of different scents because of a variety of odor receptors, which translate the impact of molecules into a neural code.

Source: <https://www.brainfacts.org>, *Making sense of scents smell and the brain*

Exercise 4

Alaskans' vitamin D production slows to a halt

Interested people are needed to participate in a one-year study to assess the effects of long dark winters on the vitamin D and calcium levels of Fairbanks residents.

So began a recruitment poster Meredith Tallas created 25 years ago. Now living in Oakland, California, Tallas was a University of Alaska Fairbanks student in 1983 who wanted to study how levels of a vitamin related to sun exposure fluctuated in people living so far from the equator.

“The most obvious vitamin to study in Alaska is vitamin D, because of the low light in winter,” Tallas said recently over the phone from her office in Berkeley. Forty-seven people responded to Tallas’ 1983 request, and her master’s project was underway. By looking at the bloodwork of those Fairbanks residents every month and analyzing their diets, she charted their levels of vitamin D, which our skin magically produces after exposure to a certain amount of sunshine. We also get vitamin D from foods, such as vitamin-D enriched milk and margarine, and fish (salmon are a good source). Vitamin D is important for prevention of bone diseases, diabetes and other maladies.

If you live at a latitude farther north than about 42 degrees (Boston, Detroit, or Eugene, Oregon), the sun is too low on the horizon from November through February for your skin to produce vitamin D, according to the National Institutes of Health. Tallas also saw another potential Alaska limitation on the natural pathway to vitamin D production.

“Most outdoor activity requires covering all but the face and hands approximately seven months of the year,” she wrote in her thesis. “During the summer months residents keep much of their bodies clothed because of the persistent and annoying mosquitoes and biting flies and because of this, an Alaskan summer suntan becomes one of the face and hands.”

But even over-bundled people like Alaskans show signs of enhanced vitamin D production from the sun. Tallas found the highest levels of vitamin D in the Fairbanks volunteers’ blood in July, and the lowest levels in March. Tallas attributed the July high occurring about a month after summer solstice to the time needed for the body’s processing of sunlight and the conversion to vitamin D.

In Tallas’ study, volunteers showed low levels of vitamin D in winter months, but most got sufficient doses of vitamin D from sources other than the sun. Tallas also found that males had an average of 16 percent more vitamin D in their blood throughout the study, which she attributed in part to men being outside more.

In charting an average for people’s time outside (you can’t convert sunlight to vitamin D through windows), she found December was the low point of sunlight exposure, when sun struck the skin of her volunteers for less than

20 minutes per day. People spent an average of more than two hours exposed to Alaska sunlight in June and July. They seemed to hunker down in October, when time outside in the sun dropped to about half an hour after almost two hours of daily sun exposure in September.

Vitamin D levels in the volunteers' blood dropped in August, September, October, November, December, January, February, and March, but Tallas saw an occasional leap in midwinter.

"When someone had gone to Hawaii, we could see, very exactly, a significant spike in their vitamin D levels," Tallas said. "The only surprise was how it came a month or two after."

In her thesis, Tallas wrote that a midwinter trip to somewhere close to the equator would be a good thing for boosting Alaskans' vitamin D levels.

"Presuming that an individual's lowest circulating vitamin D level is found in March or April, such trips could potentially have a very significant effect in improving late winter vitamin D status," she wrote in her thesis. "Unfortunately a majority of Alaskan residents do not take such trips often."

An easy alternative for Alaskans not traveling southward during the winter is eating foods rich in vitamin D or taking vitamin D supplements, Tallas said.

Questions 1 - 9 Do the following statements agree with the information given in the reading passage?

Write: NOT GIVEN, FALSE, TRUE

1. Tallas wanted to know why the levels of Vitamin D were lower in people from Alaska.
2. Men, women and children volunteered for the study.
3. People in Boston have higher levels of diabetes.
4. Vitamin D levels were found to peak in July.
5. All of the volunteers obtained high enough levels of Vitamin D in the winter.
6. Men had higher levels of Vitamin D.
7. People become depressed in the winter because of the lack of sunlight.

8. Vitamin D levels dropped over eight consecutive months.
9. Many Alaskans go on trips in the winter.

Source: <https://www.gi.alaska.edu/>, *Alaskans' vitamin D production slows to a halt*

Practice Exercises

Practice 1

William Henry Perkin

The man who invented synthetic dyes

William Henry Perkin was born on March 12, 1838, in London, England. As a boy, Perkin's curiosity prompted early interests in the arts, sciences, photography, and engineering. But it was a chance stumbling upon a run-down, yet functional, laboratory in his late grandfather's home that solidified the young man's enthusiasm for chemistry.

As a student at the City of London School, Perkin became immersed in the study of chemistry. His talent and devotion to the subject were perceived by his teacher, Thomas Hall, who encouraged him to attend a series of lectures given by the eminent scientist Michael Faraday at the Royal Institution. Those speeches fired the young chemist's enthusiasm further, and he later went on to attend the Royal College of Chemistry, which he succeeded in entering in 1853, at the age of 15.

At the time of Perkin's enrollment, the Royal College of Chemistry was headed by the noted German chemist August Wilhelm Hofmann. Perkin's scientific gifts soon caught Hofmann's attention and within two years, he became Hofmann's youngest assistant. Not long after that, Perkin made the scientific breakthrough that would bring him both fame and fortune.

At the time, quinine was the only viable medical treatment for malaria. The drug is derived from the bark of the cinchona tree, native to South America and by 1856 demand for the drug was surpassing the available supply. Thus,

when Hofmann made some passing comments about the desirability of a synthetic substitute for quinine, it was unsurprising that his star pupil was moved to take up the challenge.

During his vacation in 1856, Perkin spent his time in the laboratory on the top floor of his family's house. He was attempting to manufacture quinine from aniline, an inexpensive and readily available coal tar waste product. Despite his best efforts, however, he did not end up with quinine. Instead, he produced a mysterious dark sludge. Luckily, Perkins' scientific training and nature prompted him to investigate the substance further. Incorporating potassium dichromate and alcohol into the aniline at various stages of the experimental process, he finally produced a deep purple solution. And, proving the truth of the famous scientist Louis Pasteur's words 'chance favors only the prepared mind'. Perkin saw the potential of his unexpected find.

Historically, textile dyes were made from such natural sources as plants and animal excretions. Some of these, such as the glandular mucus of snails, were difficult to obtain and outrageously expensive. Indeed, the purple colour extracted from a snail was once so costly that in society at the time only the rich could afford it. Further, natural dyes tended to be muddy in hue and fade quickly. It was against this backdrop that Perkin's discovery was made.

Perkin quickly grasped that his purple solution could be used to colour fabric, thus making it the world's first synthetic dye. Realising the importance of this breakthrough, he lost no time in patenting it. But perhaps the most fascinating of all Perkin's reactions to his find was his nearly instant recognition that the new dye had commercial possibilities.

Perkin originally named his dye Tyrian Purple, but it later became commonly known as mauve (from the French for the plant used to make the colour violet). He asked advice of Scottish dye works owner Robert Pullar, who assured him that manufacturing the dye would be well worth it if the colour remained fast (i.e. would not fade) and the cost was relatively low. So, over the fierce objections of his mentor Hofmann, he left college to give birth to the modern chemical industry.

With the help of his father and brother, Perkin set up a factory not far from London. Utilizing the cheap and plentiful coal tar that was an almost unlimited

by product of London's gas street lighting, the dye works began producing the world's first synthetically dyed material in 1857. The company received a commercial boost from the Empress Eugenie of France, when she decided the new color flattered her. Very soon, mauve was the necessary shade for all the fashionable ladies in that country. Not to be outdone, England's Queen Victoria also appeared in public wearing a mauve gown, thus making it all the rage in England as well. The dye was bold and fast, and the public clamour for more. Perkin went back to the drawing board.

Although Perkins' fame was achieved and fortune assured by his first discovery, the chemist continued his research. Among other dyes he developed and introduced were aniline red (1859) and aniline black (1863) and in the late 1860s, Perkin's green. It is important to note that Perkin's synthetic dye discoveries had outcomes far beyond the merely decorative. The dyes also became vital to medical research in many ways. For instance, they were used to stain previously invisible microbes and bacteria, allowing researchers to identify such bacilli as tuberculosis, cholera, and anthrax. Artificial dyes continue to play a crucial role today. And, in what would have been particularly pleasing to Perkin, their current use is in the search for a vaccine against malaria.

Questions 1-7

Do the following statements agree with the information given in Reading Passage 1? In boxes 1-7 on your answer sheet, write:

- | | |
|------------------|--|
| TRUE | if the statement agrees with the information |
| FALSE | if the statement contradicts the information |
| NOT GIVEN | if there is no information on this more than once. |

- 1 Michael Faraday was the first person to recognize Perkin's ability as a student of chemistry.
- 2 Michael Faraday suggested Perkin should enroll in the Royal College of Chemistry.
- 3 Perkin employed August Wilhelm Hofmann as his assistant.
- 4 Perkin was still young when he made the discovery that made him rich and famous.
- 5 The trees from which quinine is derived grow only in South America.
- 6 Perkin hoped to manufacture a drug from a coal tar waste product.
- 7 Perkin was inspired by the discoveries of the famous scientist Louis Pasteur.

Solved Answer 1:

Question 1: Michael Faraday was the first person to recognise Perkin's ability as a student of chemistry.

Keywords for the question: Michael Faraday first person, recognise, Perkin's ability, student of chemistry.

Take a look at paragraph no, 2 where the writer mentions, "His talent and devotion to the subject were perceived by his teacher (at the City of London school) Thomas Hall.. This line suggests the fact that it was Thomas Hal, and not Michael Faraday, who first recognised the talent of Perkin in Chemistry He also advised Perkin to attend the lectures given by Faraday.

So, the answer is FALSE

Source: Cambridge Book 9

Practice 2

The Search for Extraterrestrial Intelligence

The question of whether we are alone in the Universe has haunted humanity for centuries, but we may now stand poised on the brink of the answer to that question, as we search for radio signals from other intelligent civilizations. This search, often known by the acronym SETI [search for extraterrestrial intelligence], is a difficult one. Although groups around the world have been searching intermittently for three decades, it is only now that we have reached the level of technology where we can make a determined attempt to search all nearby stars for any sign of life.

A

The primary reason for the search is basic curiosity - the same curiosity about the natural world that drives all pure science. We want to know whether we are alone in the Universe. We want to know whether life evolves naturally if given the right conditions, or whether there is something very special about the Earth to have fostered the variety of life forms that we see around us on

the planet. The simple detection of a radio signal will be sufficient to answer this most basic of all questions. In this sense, SETI is another cog in the machinery of pure science which is continually pushing out the horizon of our knowledge. However, there are other reasons for being interested in whether life exists elsewhere. For example, we have had civilization on Earth for perhaps only a few thousand years, and the threats of nuclear war and pollution over the last few decades have told us that our survival may be tenuous. Will we last another two thousand years or will we wipe ourselves out? Since the lifetime of a planet like ours is several billion years, we can expect that if other civilizations do survive in our galaxy, their ages will range from zero to several billion years. Thus any other civilization that we hear from is likely to be far older on average than ourselves. The mere existence of such a civilization will tell us that long-term survival is possible, and gives us some cause for optimism. It is even possible that the older civilization may pass on the benefits of their experience in dealing with threats to survival such as nuclear war and global pollution, and other threats that we haven't yet discovered.

B

In discussing whether we are alone, most SETI scientists adopt two ground rules. First, UFOs [Unidentified Flying objects] are generally ignored since most scientists don't consider the evidence for them to be strong enough to bear serious consideration (although it is also important to keep an open mind in case any really convincing evidence emerges in the future). Second, we make a very conservative assumption that we are looking for a life form that is pretty well like us, since if it differs radically from us we may well not recognize it as a life form, quite apart from whatever we are able to communicate with it. In other words, the life form we are looking for may well have two green heads and seven fingers, but it will nevertheless resemble us in that it should communicate with its fellows. Be interested in the Universe, Live on a planet orbiting a star like our Sun, and perhaps most restrictively have chemistry, like us, based on carbon and water.

C

Even when we make these assumptions. our understanding of other life forms is still severely limited. We do not even know. for example, how many stars have planets, and we certainly do not know how likely it is that life will arise naturally,

given the right conditions. However, when we look at the 100 billion stars in our galaxy [the Milky Way], and 100 billion galaxies. In the observable Universe, It seems inconceivable that at least one of these planets does not have a life form on it; in fact, the best educated guess we can make using the little that we do know about the conditions for carbon-based life, leads us to estimate that perhaps one in 100,000 stars might have a life-bearing planet orbiting it. That means that our nearest neighbors are perhaps 1000 light years away. which is almost next door in astronomical terms.

D

An alien civilization could choose many different ways of sending information across the galaxy, but many of these either require too much energy. or else are severely attenuated while traversing the vast distances across the galaxy. It turns out that. for a given amount of transmitted power: radio waves in the frequency range 1000 to 3000 MHz travel the greatest distance. and so all searches to date have concentrated on looking for radio waves in this frequency range. So far there have been a number of searches by various groups around the world, including Australian searches using the radio telescope at Parkes, New South Wales. Until now there have not been any detections from the few hundred stars which have been searched. The scale of the searches has been increased dramatically since 1992, when the US Congress voted NASA \$10 million per year for ten years to conduct a thorough search for extraterrestrial life. Much of the money in this project is being spent on developing the special hardware needed to search many frequencies at once. The project has two parts. One part is a targeted search using the world's largest radio telescopes. The American-operated telescope in Arecibo. Puerto Rico and the French telescope in Nancy in France. This part of the project is searching the nearest 1000 likely stars with a high sensibility for signals in the frequency range 1000 to 3000 MHz. The other part of the project is an undirected search which is monitoring all of the space with a lower one using the smaller antennas of NASA's Deep Space Network.

E

There is considerable debate over how we should react if we detect a signal from an alien civilization. Everybody agrees that we should not reply immediately. Quite apart from the impracticality of sending a reply over such

large distances at short notice, it raises a host of ethical questions that would have to be addressed by the global community before any reply could be sent. Would the human race face culture shock if faced with a superior and much older civilization? Luckily, there is no urgency about this. The stars being searched are hundreds of light years away. so it takes hundreds of years for their signal to reach us, and a further few hundred years for our reply to reach them. It is not important, then, if there's a delay of a few years, or decades, while the human race debates the question of whether to reply and perhaps carefully drafts a reply.

Questions 1-6

Do the following statements agree with the views of the writer in the Reading Passage?

In boxes on your answer sheet, write:

TRUE : if the statement agrees with the information

FALSE : if the statement contradicts the information

NOT GIVEN : if there is no information on this more than once.

1. Alien civilizations may be able to help the human race to overcome serious problems
2. SETI scientists are trying to find a life form that resembles humans in many ways.
3. The Americans and Australians have cooperated on joint research projects.
4. So far SETI scientists have picked up radio signals from several stars.
5. The NASA project attracted criticism from some members of Congress.
6. If a signal from outer space is received, it will be important to respond promptly.

Source: Cambridge Book 9

Practice 3

The Context, Meaning and Scope of Tourism

A

Travel has existed since the beginning of time, when primitive man set out, often traversing great distances in search of game, which provided the food and clothing necessary for his survival. Throughout the course of history, people have travelled for purposes of trade, religious conviction, economic gain, war, migration and other equally compelling motivations. In the Roman era, wealthy aristocrats and high government officials also travelled for pleasure. Seaside resorts located at Pompeii and Herculaneum afforded citizens the opportunity to escape to their vacation villas in order to avoid the summer heat of Rome. Travel, except during the Dark Ages, has continued to grow and, throughout recorded history, has played a vital role in the development of civilisations and their economies.

B

Tourism in the mass form as we know it today is a distinctly twentieth-century phenomenon. Historians suggest that the advent of mass tourism began in England during the industrial revolution with the rise of the middle class and the availability of relatively inexpensive transportation. The creation of the commercial airline industry following the Second World War and the subsequent development of the jet aircraft in the 1950s signalled the rapid growth and expansion of international travel. This growth led to the development of a major new industry: tourism. In turn, international tourism became the concern of a number of world governments since it not only provided new employment opportunities but also produced a means of earning foreign exchange.

C

Tourism today has grown significantly in both economic and social importance. In most industrialised countries over the past few years the fastest growth has been seen in the area of services. One of the largest segments of the service industry, although largely unrecognised as an entity

in some of these countries, is travel and tourism. According to the World Travel and Tourism Council (1992), Travel and tourism is the largest industry in the world on virtually any economic measure including value-added capital investment, employment and tax contributions. In 1992 'the industry's gross output was estimated to be \$3.5 trillion, over 12 percent of all consumer spending. The travel and tourism industry is the world's largest employer with almost 130 million jobs, or almost 7 per cent of all employees. This industry is the world's leading industrial contributor, producing over 6 percent of the world's national product and accounting for capital investment in excess of \$422 billion m direct indirect and personal taxes each year. Thus, tourism has a profound impact both on the world economy and, because of the educative effect of travel and the effects on employment, on society itself.

D

However, the major problems of the travel and tourism industry that have hidden, or obscured, its economic impact are the diversity and fragmentation of the industry itself. The travel industry includes: hotels, motels and other types of accommodation; restaurants and other food services; transportation services and facilities; amusements, attractions and other leisure facilities; gift shops and a large number of other enterprises. Since many of these businesses also serve local residents, the impact of spending by visitors can easily be overlooked or underestimated. In addition, Meis (1992) points out that the tourism industry involves concepts that have remained amorphous to both analysts and decision makers. Moreover, in all nations this problem has made it difficult for the industry to develop any type of reliable or credible tourism information base in order to estimate the contribution it makes to regional, national and global economies. However, the nature of this diversity makes travel and tourism ideal vehicles for economic development in a wide variety of countries, regions or communities.

E

Once the exclusive province of the wealthy, travel and tourism have become an institutionalised way of life for most of the population. In fact, McIntosh and Goeldner (1990) suggest that tourism has become the largest commodity in international trade for many nations and, for a significant number of other

countries, it ranks second or third. For example, tourism is the major source of income in Bermuda, Greece, Italy, Spain, Switzerland and most Caribbean countries. In addition, Hawkins and Ritchie, quoting from data published by the American Express Company, suggest that the travel and tourism industry is the number one ranked employer in the Bahamas, Brazil, Canada, France, (the former) West Germany, Hong Kong, Italy, Jamaica, Japan, Singapore, the United Kingdom and the United States. However, because of problems of definition, which directly affect statistical measurement, it is not possible with any degree of certainty to provide precise, valid or reliable data about the extent of world-wide tourism participation or its economic impact. In many cases, similar difficulties arise when attempts are made to measure domestic tourism.

Questions 1-6

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1- 6 on your answer sheet, write

TRUE : if the statement agrees with the information

FALSE : if the statement contradicts the information

NOT GIVEN if there is no information on this

1. The largest employment figures in the world are found in the travel and tourism industry.
2. Tourism contributes over six per cent of the Australian gross national product.
3. Tourism has a social impact because it promotes recreation.
4. Two main features of the travel and tourism industry make its economic significance difficult to ascertain.
5. Visitor spending is always greater than the spending of residents in tourist areas.
6. It is easy to show statistically how tourism affects individual economies.

Source: Cambridge Book 10

Practice 4

Beyond the blue horizon

Ancient voyagers who settled the far-flung islands of the Pacific Ocean

An important archaeological discovery on the island of Efate in the Pacific archipelago of Vanuatu has revealed traces of an ancient seafaring people, the distant ancestors of today's Polynesians. The site came to light only by chance. An agricultural worker, digging in the grounds of a derelict plantation, scraped open a grave – the first of dozens in a burial ground some 3,000 years old. It is the oldest cemetery ever found in the Pacific islands, and it harbors the remains of an ancient people archaeologists call the Lapita.

They were daring blue-water adventurers who used basic canoes to rove across the ocean. But they were not just explorers. They were also pioneers who carried with them everything they would need to build new lives – their livestock, taro seedlings and stone tools. Within the span of several centuries, the Lapita stretched the boundaries of their world from the jungle-clad volcanoes of Papua New Guinea to the loneliest coral outliers of Tonga.

The Lapita left precious few clues about themselves, but Efate expands the volume of data available to researchers dramatically. The remains of 62 individuals have been uncovered so far, and archaeologists were also thrilled to find six complete Lapita pots. Other items included a Lapita burial urn with modeled birds arranged on the rim as though peering down at the human remains sealed inside. 'It's an important discovery,' says Matthew Spriggs, professor of archaeology at the Australian National University and head of the international team digging up the site, 'for it conclusively identifies the remains as Lapita.'

DNA teased from these human remains may help answer one of the most puzzling questions in Pacific anthropology: did all Pacific islanders spring from one source or many? Was there only one outward migration from a single point in Asia, or several from different points? 'This represents the best opportunity we've had yet,' says Spriggs, 'to find out who the Lapita actually were, where they came from, and who their closest descendants are today.'

There is one stubborn question for which archaeology has yet to provide any answers: how did the Lapita accomplish the ancient equivalent of a moon landing, many times over? No-one has found one of their canoes or any rigging, which could reveal how the canoes were sailed. Nor do the oral histories and traditions of later Polynesians offer any insights, for they turn into myths long before they reach as far back in time as the Lapita.

‘All we can say for certain is that the Lapita had canoes that were capable of ocean voyages, and they had the ability to sail them,’ says Geoff Irwin, a professor of archaeology at the University of Auckland. Those sailing skills, he says, were developed and passed down over thousands of years by earlier mariners who worked their way through the archipelagoes of the western Pacific, making short crossings to nearby islands. The real adventure didn’t begin, however, until their Lapita descendants sailed out of sight of land, with empty horizons on every side. This must have been as difficult for them as landing on the moon is for us today. Certainly it distinguished them from their ancestors, but what gave them the courage to launch out on such risky voyages?

The Lapita was thrust into the Pacific was eastward, against the prevailing trade winds, Irwin notes. Those nagging headwinds, he argues, may have been the key to their success. ‘They could sail out for days into the unknown and assess the area, secure in the knowledge that if they didn’t find anything, they could turn about and catch a swift ride back on the trade winds. This is what would have made the whole thing work.’ Once out there, skilled seafarers would have detected abundant leads to follow to land: seabirds, coconuts and twigs carried out to sea by the tides, and the afternoon pile-up of clouds on the horizon which often indicates an island in the distance.

For returning explorers, successful or not, the geography of their own archipelagoes would have provided a safety net. Without this to go by, overshooting their home ports, getting lost and sailing off into eternity would have been all too easy. Vanuatu, for example, stretches more than 500 miles in a northwest-southeast trend, its scores of intervisible islands forming a backstop for mariners riding the trade winds home.

All this presupposes one essential detail, says Atholl Anderson, professor of prehistory at the Australian National University: the Lapita had mastered the

advanced art of sailing against the wind. 'And there's no proof they could do any such thing,' Anderson says. 'There has been this assumption they made, and people have built canoes to recreate those early voyages based on that assumption. But nobody has any idea what their canoes looked like or how they were rigged.'

Rather than give all the credit to human skill, Anderson invokes the winds of chance. El Nino, the same climate disruption that affects the Pacific today, may have helped scatter the Lapita, Anderson suggests. He points out that climate data obtained from slow-growing corals around the Pacific indicate a series of unusually frequent El Ninos around the time of the Lapita expansion. By reversing the regular east-to-west flow of the trade winds for weeks at a time, these super El Ninos might have taken the Lapita on long unplanned voyages.

However they did it, the Lapita spread themselves a third of the way across the Pacific, then called it quits for reasons known only to them. Ahead lay the vast emptiness of the central Pacific and perhaps they were too thinly stretched to venture farther. They probably never numbered more than a few thousand in total, and in their rapid migration eastward they encountered hundreds of islands – more than 300 in Fiji alone.

Questions 1-5

Do the following statements agree with the views of the writer in the Reading Passage ?

In boxes 1- 5 on your answer sheet, write

YES : if the statement agrees with the views of the writer

NO : if the statement contradicts the views of the writer

NOT GIVEN : if it is impossible to say what the writer thinks about this

1. It is now clear that the Lapita could sail into a prevailing wind.
2. Extreme climate conditions may have played a role in Lapita migration.

3. The Lapita learnt to predict the duration of El Ninos.
4. It remains unclear why the Lapita halted their expansion across the Pacific.
5. It is likely that the majority of Lapita settled on Fiji

Source: Cambridge Book 10

Practice 5

Why Pagodas Don't Fall Down

In a land swept by typhoons and shaken by earthquakes, how have Japan's tallest and seemingly flimsiest old buildings – 500 or so wooden pagodas – remained standing for centuries? Records show that only two have collapsed during the past 1400 years. Those that have disappeared were destroyed by fire as a result of lightning or civil war. The disastrous Hanshin earthquake in 1995 killed 6,400 people, toppled elevated highways, flattened office blocks and devastated the port area of Kobe. Yet it left the magnificent five-storey pagoda at the Toji temple in nearby Kyoto unscathed, though it levelled a number of buildings in the neighbourhood.

Japanese scholars have been mystified for ages about why these tall, slender buildings are so stable. It was only thirty years ago that the building industry felt confident enough to erect office blocks of steel and reinforced concrete that had more than a dozen floors. With its special shock absorbers to dampen the effect of sudden sideways movements from an earthquake, the thirty-six-storey Kasumigaseki building in central Tokyo – Japan's first skyscraper – was considered a masterpiece of modern engineering when it was built in 1968.

Yet in 826, with only pegs and wedges to keep his wooden structure upright, the master builder Kobodaishi had no hesitation in sending his majestic Toji pagoda soaring fifty-five metres into the sky – nearly half as high as the Kasumigaseki skyscraper built some eleven centuries later. Clearly, Japanese carpenters of the day knew a few tricks about allowing a building to sway and settle itself rather than fight nature's forces. But what sort of tricks?

The multi-storey pagoda came to Japan from China in the sixth century. As in China, they were first introduced with Buddhism and were attached to

important temples. The Chinese built their pagodas in brick or stone, with inner staircases, and used them in later centuries mainly as watchtowers. When the pagoda reached Japan, however, its architecture was freely adapted to local conditions – they were built less high, typically five rather than nine storeys, made mainly of wood and the staircase was dispensed with because the Japanese pagoda did not have any practical use but became more of an art object. Because of the typhoons that batter Japan in the summer, Japanese builders learned to extend the eaves of buildings further beyond the walls. This prevents rainwater gushing down the walls. Pagodas in China and Korea have nothing like the overhang that is found on pagodas in Japan.

The roof of a Japanese temple building can be made to overhang the sides of the structure by fifty per cent or more of the building's overall width. For the same reason, the builders of Japanese pagodas seem to have further increased their weight by choosing to cover these extended eaves not with the porcelain tiles of many Chinese pagodas but with much heavier earthenware tiles.

But this does not totally explain the great resilience of Japanese pagodas. Is the answer that, like a tall pine tree, the Japanese pagoda – with its massive trunk-like central pillar known as *shinbashira* – simply flexes and sways during a typhoon or earthquake? For centuries, many thought so. But the answer is not so simple because the startling thing is that the *shinbashira* actually carries no load at all. In fact, in some pagoda designs, it does not even rest on the ground, but is suspended from the top of the pagoda – hanging loosely down through the middle of the building. The weight of the building is supported entirely by twelve outer and four inner columns.

And what is the role of the *shinbashira*, the central pillar? The best way to understand the *shinbashira*'s role is to watch a video made by Shuzo Ishida, a structural engineer at Kyoto Institute of Technology. Mr Ishida, known to his students as 'Professor Pagoda' because of his passion to understand the pagoda, has built a series of models and tested them on a 'shake- table' in his laboratory. In short, the *shinbashira* was acting like an enormous stationary pendulum. The ancient craftsmen, apparently without the assistance of very advanced mathematics, seemed to grasp the principles that were, more than a thousand years later, applied in the construction of Japan's first skyscraper.

What those early craftsmen had found by trial and error was that under pressure a pagoda's loose stack of floors could be made to slither to and fro independent of one another. Viewed from the side, the pagoda seemed to be doing a snake dance – with each consecutive floor moving in the opposite direction to its neighbours above and below. The shinbashira, running up through a hole in the centre of the building, constrained individual storeys from moving too far because, after moving a certain distance, they banged into it, transmitting energy away along the column.

Another strange feature of the Japanese pagoda is that, because the building tapers, with each successive floor plan being smaller than the one below, none of the vertical pillars that carry the weight of the building is connected to its corresponding pillar above. In other words, a five-storey pagoda contains not even one pillar that travels right up through the building to carry the structural loads from the top to the bottom. More surprising is the fact that the individual storeys of a Japanese pagoda, unlike their counterparts elsewhere, are not actually connected to each other. They are simply stacked one on top of another like a pile of hats. Interestingly, such a design would not be permitted under current Japanese building regulations.

And the extra-wide eaves? Think of them as a tightrope walker's balancing pole. The bigger the mass at each end of the pole, the easier it is for the tightrope walker to maintain his or her balance. The same holds true for a pagoda. 'With the eaves extending out on all sides like balancing poles,' says Mr Ishida, 'the building responds to even the most powerful jolt of an earthquake with a graceful swaying, never an abrupt shaking.' Here again, Japanese master builders of a thousand years ago anticipated concepts of modern structural engineering.

Questions 1-4

Do the following statements agree with the claims of the writer in the Reading Passage In boxes 1-4 on your answer sheet, write

YES : if the statement agrees with the claims of the writer

NO : if the statement contradicts the claims of the writer

NOT GIVEN : if there it impossible to say what the writer thinks about this

1. Only two Japanese pagodas have collapsed in 1400 years.
2. The Hanshin earthquake of 1995 destroyed the pagoda at the Toji temple.
3. The other buildings near the Toji pagoda had been built in the last 30 years.
4. The builders of pagodas knew how to absorb some of the power produced by severe weather conditions.

Source: Cambridge Book 7

Practice 6

True Cost of Food

A For more than forty years the cost of food has been rising. It has now reached a point where a growing number of people believe that it is far too high, and that bringing it down will be one of the great challenges of the twenty-first century. That cost, however, is not in immediate cash. In the West at least, most food is now far cheaper to buy in relative terms than it was in 1960.

The cost is in the collateral damage of the very methods of food production that have made the food cheaper: in the pollution of water, the enervation of soil, the destruction of wildlife, the harm to animal welfare and the threat to human health caused by modern industrial agriculture.

B First mechanisation, then mass use of chemical fertilisers and pesticides, then monocultures, then battery rearing of livestock, and now genetic engineering – the onward march of intensive farming has seemed unstoppable in the last half-century, as the yields of produce have soared. But the damage it has caused has been colossal. In Britain, for example, many of our best-loved farmland birds, such as the skylark, the grey partridge, the lapwing and the corn bunting, have vanished from huge stretches of countryside, as have even more wild flowers and insects. This is a direct result of the way we have produced our food in the last four decades. Thousands of miles of hedgerows, thousands of ponds, have

disappeared from the landscape. The faecal filth of salmon farming has driven wild salmon from many of the sea lochs and rivers of Scotland. Natural soil fertility is dropping in many areas because of continuous industrial fertiliser and pesticide use, while the growth of algae is increasing in lakes because of the fertiliser run-off.

C Put it all together and it looks like a battlefield, but consumers rarely make the connection at the dinner table. That is mainly because the costs of all this damage are what economists refer to as externalities: they are outside the main transaction, which is for example producing and selling a field of wheat, and are borne directly by neither producers nor consumers. To many, the costs may not even appear to be financial at all, but merely aesthetic – a terrible shame, but nothing to do with money. And anyway they, as consumers of food, certainly aren't paying for it, are they?

D But the costs to society can actually be quantified and, when added up, can amount to staggering sums. A remarkable exercise in doing this has been carried out by one of the world's leading thinkers on the future of agriculture, Professor Jules Pretty, Director of the Centre for Environment and Society at the University of Essex. Professor Pretty and his colleagues calculated the externalities of British agriculture for one particular year. They added up the costs of repairing the damage it caused, and came up with a total figure of £2,343m. This is equivalent to £208 for every hectare of arable land and permanent pasture, almost as much again as the total government and EU spend on British farming in that year. And according to Professor Pretty, it was a conservative estimate.

E The costs included: £120m for removal of pesticides; £16m for removal of nitrates; £55m for removal of phosphates and soil; £23m for the removal of the bug *Cryptosporidium* from drinking water by water companies; £125m for damage to wildlife habitats, hedgerows and dry stone walls; £1,113m from emissions of gases likely to contribute to climate change; £106m from soil erosion and organic carbon losses; £169m from food poisoning; and £607m from cattle disease. Professor Pretty draws a simple but memorable conclusion from all this: our food bills are actually threefold. We are paying for our supposedly cheaper food in three separate ways: once over the counter,

secondly through our taxes, which provide the enormous subsidies propping up modern intensive farming, and thirdly to clean up the mess that modern farming leaves behind.

F So can the true cost of food be brought down? Breaking away from industrial agriculture as the solution to hunger may be very hard for some countries, but in Britain, where the immediate need to supply food is less urgent, and the costs and the damage of intensive farming have been clearly seen, it may be more feasible. The government needs to create sustainable, competitive and diverse farming and food sectors, which will contribute to a thriving and sustainable rural economy, and advance environmental, economic, health, and animal welfare goals.

G But if industrial agriculture is to be replaced, what is a viable alternative? Professor Pretty feels that organic farming would be too big a jump in thinking and in practices for many farmers. Furthermore, the price premium would put the produce out of reach of many poorer consumers. He is recommending the immediate introduction of a 'Greener Food Standard', which would push the market towards more sustainable environmental practices than the current norm, while not requiring the full commitment to organic production. Such a standard would comprise agreed practices for different kinds of farming, covering agrochemical use, soil health, land management, water and energy use, food safety and animal health. It could go a long way, he says, to shifting consumers as well as farmers towards a more sustainable system of agriculture.

Questions 1- 4

Do the following statements agree with the claims of the writer in Reading Passage 2? In boxes 1- 4 on your answer sheet, write

YES : if the statement agrees with the claims of the writer

NO : if the statement contradicts the claims of the writer

NOT GIVEN : if it is impossible to say what the writer thinks about this

1. Several species of wildlife in the British countryside are declining.
2. The taste of food has deteriorated in recent years.
3. The financial costs of environmental damage are widely recognised.
4. One of the costs calculated by Professor Pretty was illness caused by food.

Source: Cambridge Book 7

Practice 7

Raising the Mary Rose

How a sixteenth-century warship was recovered from the seabed

On 19 July 1545, English and French fleets were engaged in a sea battle off the coast of southern England in the area of water called the Solent, between Portsmouth and the Isle of Wight. Among the English vessels was a warship by the name of Mary Rose. Built in Portsmouth some 35 years earlier, she had had a long and successful fighting career, and was a favourite of King Henry VIII. Accounts of what happened to the ship vary: while witnesses agree that she was not hit by the French, some maintain that she was outdated, overladen and sailing too low in the water, others that she was mishandled by undisciplined crew. What is undisputed, however, is that the Mary Rose sank into the Solent that day, taking at least 500 men with her. After the battle, attempts were made to recover the ship, but these failed.

The Mary Rose came to rest on the seabed, lying on her starboard (right) side at an angle of approximately 60 degrees. The hull (the body of the ship) acted as a trap for the sand and mud carried by Solent currents. As a result, the starboard side filled rapidly, leaving the exposed port (left) side to be eroded by marine organisms and mechanical degradation. Because of the way the ship sank, nearly all of the starboard half survived intact. During the seventeenth and eighteenth centuries, the entire site became covered with a layer of hard grey clay, which minimised further erosion.

Then, on 16 June 1836, some fishermen in the Solent found that their equipment was caught on an underwater obstruction, which turned out to be

the Mary Rose. Diver John Deane happened to be exploring another sunken ship nearby, and the fishermen approached him, asking him to free their gear. Deane dived down, and found the equipment caught on a timber protruding slightly from the seabed. Exploring further, he uncovered several other timbers and a bronze gun. Deane continued diving on the site intermittently until 1840, recovering several more guns, two bows, various timbers, part of a pump and various other small finds.

The Mary Rose then faded into obscurity for another hundred years. But in 1965, military historian and amateur diver Alexander McKee, in conjunction with the British Sub-Aqua Club, initiated a project called 'Solent Ships'. While on paper this was a plan to examine a number of known wrecks in the Solent, what McKee really hoped for was to find the Mary Rose. Ordinary search techniques proved unsatisfactory, so McKee entered into collaboration with Harold E. Edgerton, professor of electrical engineering at the Massachusetts Institute of Technology. In 1967, Edgerton's side-scan sonar systems revealed a large, unusually shaped object, which McKee believed was the Mary Rose. Further excavations revealed stray pieces of timber and an iron gun. But the climax to the operation came when, on 5 May 1971, part of the ship's frame was uncovered. McKee and his team now knew for certain that they had found the wreck, but were as yet unaware that it also housed a treasure trove of beautifully preserved artefacts. Interest in the project grew, and in 1979, The Mary Rose Trust was formed, with Prince Charles as its President and Dr Margaret Rule its Archaeological Director. The decision whether or not to salvage the wreck was not an easy one, although an excavation in 1978 had shown that it might be possible to raise the hull. While the original aim was to raise the hull if at all feasible, the operation was not given the go-ahead until January 1982, when all the necessary information was available.

An important factor in trying to salvage the Mary Rose was that the remaining hull was an open shell. This led to an important decision being taken: namely to carry out the lifting operation in three very distinct stages. The hull was attached to a lifting frame via a network of bolts and lifting wires. The problem of the hull being sucked back downwards into the mud was overcome by using 12 hydraulic jacks. These raised it a few centimetres over a period of several days, as the lifting frame rose slowly up its four legs. It was only when

the hull was hanging freely from the lifting frame, clear of the seabed and the suction effect of the surrounding mud, that the salvage operation progressed to the second stage. In this stage, the lifting frame was fixed to a hook attached to a crane, and the hull was lifted completely clear of the seabed and transferred underwater into the lifting cradle. This required precise positioning to locate the legs into the stabbing guides of the lifting cradle. The lifting cradle was designed to fit the hull using archaeological survey drawings, and was fitted with air bags to provide additional cushioning for the hull's delicate timber framework. The third and final stage was to lift the entire structure into the air, by which time the hull was also supported from below. Finally, on 11 October 1982, millions of people around the world held their breath as the timber skeleton of the Mary Rose was lifted clear of the water, ready to be returned home to Portsmouth.

Questions 1-4

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1-4 on your answer sheet, write

TRUE : if the statement agrees with the information

FALSE : if the statement contradicts the information

NOT GIVEN : if there is no information on this

1. There is some doubt about what caused the Mary Rose to sink.
2. The Mary Rose was the only ship to sink in the battle of 19 July 1545.
3. Most of one side of the Mary Rose lay undamaged under the sea.
4. Alexander McKee knew that the wreck would contain many valuable historical objects.

Source: Cambridge Book 11

Practice 8

Neuroaesthetics

An emerging discipline called neuroaesthetics is seeking to bring scientific objectivity to the study of art, and has already given us a better understanding of many masterpieces. The blurred imagery of Impressionist paintings seems to stimulate the brain's amygdala, for instance. Since the amygdala plays a crucial role in our feelings, that finding might explain why many people find these pieces so moving.

Could the same approach also shed light on abstract twentieth-century pieces, from Mondrian's geometrical blocks of colour, to Pollock's seemingly haphazard arrangements of splashed paint on canvas? Sceptics believe that people claim to like such works simply because they are famous. We certainly do have an inclination to follow the crowd. When asked to make simple perceptual decisions such as matching a shape to its rotated image, for example, people often choose a definitively wrong answer if they see others doing the same. It is easy to imagine that this mentality would have even more impact on a fuzzy concept like art appreciation, where there is no right or wrong answer.

Angelina Hawley-Dolan, of Boston College, Massachusetts, responded to this debate by asking volunteers to view pairs of paintings – either the creations of famous abstract artists or the doodles of infants, chimps and elephants. They then had to judge which they preferred. A third of the paintings were given no captions, while many were labelled incorrectly -volunteers might think they were viewing a chimp's messy brush strokes when they were actually seeing an acclaimed masterpiece. In each set of trials, volunteers generally preferred the work of renowned artists, even when they believed it was by an animal or a child. It seems that the viewer can sense the artist's vision in paintings, even if they can't explain why.

Robert Pepperell, an artist based at Cardiff University, creates ambiguous works that are neither entirely abstract nor clearly representational. In one study, Pepperell and his collaborators asked volunteers to decide how powerful they considered an artwork to be, and whether they saw anything familiar in the

piece. The longer they took to answer these questions, the more highly they rated the piece under scrutiny, and the greater their neural activity. It would seem that the brain sees these images as puzzles, and the harder it is to decipher the meaning, the more rewarding is the moment of recognition.

And what about artists such as Mondrian, whose paintings consist exclusively of horizontal and vertical lines encasing blocks of colour? Mondrian's works are deceptively simple, but eye-tracking studies confirm that they are meticulously composed, and that simply rotating a piece radically changes the way we view it. With the originals, volunteers' eyes tended to stay longer on certain places in the image, but with the altered versions they would flit across a piece more rapidly. As a result, the volunteers considered the altered versions less pleasurable when they later rated the work.

In a similar study, Oshin Vartanian of Toronto University asked volunteers to compare original paintings with ones which he had altered by moving objects around within the frame. He found that almost everyone preferred the original, whether it was a Van Gogh still life or an abstract by Miro. Vartanian also found that changing the composition of the paintings reduced activation in those brain areas linked with meaning and interpretation.

In another experiment, Alex Forsythe of the University of Liverpool analysed the visual intricacy of different pieces of art, and her results suggest that many artists use a key level of detail to please the brain. Too little and the work is boring, but too much results in a kind of 'perceptual overload', according to Forsythe. What's more, appealing pieces both abstract and representational, show signs of 'fractals' – repeated motifs recurring in different scales, fractals are common throughout nature, for example in the shapes of mountain peaks or the branches of trees. It is possible that our visual system, which evolved in the great outdoors, finds it easier to process such patterns.

It is also intriguing that the brain appears to process movement when we see a handwritten letter, as if we are replaying the writer's moment of creation. This has led some to wonder whether Pollock's works feel so dynamic because the brain reconstructs the energetic actions the artist used as he painted. This may be down to our brain's 'mirror neurons', which are known to mimic others' actions. The hypothesis will need to be thoroughly tested, however. It might

even be the case that we could use neuroaesthetic studies to understand the longevity of some pieces of artwork. While the fashions of the time might shape what is currently popular, works that are best adapted to our visual system may be the most likely to linger once the trends of previous generations have been forgotten.

It's still early days for the field of neuroaesthetics – and these studies are probably only a taste of what is to come. It would, however, be foolish to reduce art appreciation to a set of scientific laws. We shouldn't underestimate the importance of the style of a particular artist, their place in history and the artistic environment of their time. Abstract art offers both a challenge and the freedom to play with different interpretations. In some ways, it's not so different from science, where we are constantly looking for systems and decoding meaning so that we can view and appreciate the world in a new way.

Questions 1- 6

Do the following statements agree with the views of the writer in Reading Passage

In boxes 1- 6 on your answer sheet, write

YES : if the statement agrees with the views of the writer

NO : if the statement contradicts the views of the writer

NOT GIVEN: if there is no information on this

1. Forsythe's findings contradicted previous beliefs on the function of 'fractals' in art.
2. Certain ideas regarding the link between 'mirror neurons' and art appreciation require further verification.
3. People's taste in paintings depends entirely on the current artistic trends of the period.

4. Scientists should seek to define the precise rules which govern people's reactions to works of art.
 5. Art appreciation should always involve taking into consideration the cultural context in which an artist worked.
 6. It is easier to find meaning in the field of science than in that of art.
- the period.

Source: Cambridge Book 11

Practice 9

The Benefits of Being Bilingual

A

According to the latest figures, the majority of the world's population is now bilingual or multilingual, having grown up speaking two or more languages. In the past, such children were considered to be at a disadvantage compared with their monolingual peers. Over the past few decades, however, technological advances have allowed researchers to look more deeply at how bilingualism interacts with and changes the cognitive and neurological systems, thereby identifying several clear benefits of being bilingual.

B

Research shows that when a bilingual person uses one language, the other is active at the same time. When we hear a word, we don't hear the entire word all at once: the sounds arrive in sequential order. Long before the word is finished, the brain's language system begins to guess what that word might be. If you hear 'can', you will likely activate words like 'candy' and 'candle' as well, at least during the earlier stages of word recognition. For bilingual people, this activation is not limited to a single language; auditory input activates corresponding words regardless of the language to which they belong. Some of the most compelling evidence for this phenomenon, called 'language co-activation', comes from studying eye movements. A Russian-English bilingual asked to 'pick up a marker' from a set of objects would look more at a

stamp than someone who doesn't know Russian, because the Russian word for 'stamp', marka, sounds like the English word he or she heard, 'marker'. In cases like this, language co-activation occurs because what the listener hears could map onto words in either language.

C

Having to deal with this persistent linguistic competition can result in difficulties, however. For instance, knowing more than one language can cause speakers to name pictures more slowly, and can increase 'tip-of-the-tongue states', when you can almost, but not quite, bring a word to mind. As a result, the constant juggling of two languages creates a need to control how much a person accesses a language at any given time. For this reason, bilingual people often perform better on tasks that require conflict management. In the classic Stroop Task, people see a word and are asked to name the colour of the word's font. When the colour and the word match (i.e., the word 'red' printed in red), people correctly name the colour more quickly than when the colour and the word don't match (i.e., the word 'red' printed in blue). This occurs because the word itself ('red') and its font colour (blue) conflict. Bilingual people often excel at tasks such as this, which top into the ability to ignore competing perceptual information and focus on the relevant aspects of the input. Bilinguals are also better at switching between two tasks; for example, when bilinguals have to switch from categorizing objects by colour (red or green) to categorizing them by shape (circle or triangle), they do so more quickly than monolingual people, reflecting better cognitive control when having to make rapid changes of strategy.

D

It also seems that the neurological roots of the bilingual advantage extend to brain areas more traditionally associated with sensory processing. When monolingual and bilingual adolescents listen to simple speech sounds without any intervening background noise, they show highly similar brain stem responses. When researchers play the same sound to both groups in the presence of background noise, however, the bilingual listeners' neural response is considerably larger, reflecting better encoding of the sound's fundamental frequency, a feature of sound closely related to pitch perception.

E

Such improvements in cognitive and sensory processing may help a bilingual person to process information in the environment, and help explain why bilingual adults acquire a third language better than monolingual adults master a second language. This advantage may be rooted in the skill of focussing on information about the new language while reducing interference from the languages they already know.

F

Research also indicates that bilingual experience may help to keep the cognitive mechanisms sharp by recruiting alternate brain networks to compensate for those that become damaged during aging. Older bilinguals enjoy improved memory relative to monolingual people, which can lead to real-world health benefits. In a study of over 200 patients with Alzheimer's disease, a degenerative brain disease, bilingual patients reported showing initial symptoms of the disease an average of five years later than monolingual patients. In a follow-up study, researchers compared the brains of bilingual and monolingual patients matched on the severity of Alzheimer's symptoms. Surprisingly, the bilinguals' brains had more physical signs of disease than their monolingual counterparts, even though their outward behaviour and abilities were the same. If the brain is an engine, bilingualism may help it to go farther on the same amount of fuel.

G

Furthermore, the benefits associated with bilingual experience seem to start very early. In one study, researchers taught seven-month-old babies growing up in monolingual or bilingual homes that when they heard a tinkling sound, a puppet appeared on one side of a screen. Halfway through the study, the puppet began appearing on the opposite side of the screen. In order to get a reward, the infants had to adjust the rule they'd learned; only the bilingual babies were able to successfully learn the new rule. This suggests that for very young children, as well as for older people, navigating a multilingual environment imparts advantages that transfer far beyond language.

Questions 1-6

Do the following statements agree with the claims of the writer in Reading Passage In boxes 1- 6 on your answer sheet, write

YES : if the statement agrees with the claims of the writer

NO : if the statement contradicts the claims of the writer

NOT GIVEN : if it is impossible to say what the writer thinks about this

1. Attitudes towards bilingualism have changed in recent years.
2. Bilingual people are better than monolingual people at guessing correctly what words are before they are finished.
3. Bilingual people consistently name images faster than monolingual people.
4. Bilingual people's brains process single sounds more efficiently than monolingual
People in all situations.
5. Fewer bilingual people than monolingual people suffer from brain disease in old age.

Source: Cambridge Book 12

Practice 10

Cork

Cork – the thick bark of the cork oak tree (*Quercus suber*) – is a remarkable material. It is tough, elastic, buoyant, and fire-resistant, and suitable for a wide range of purposes. It has also been used for millennia: the ancient Egyptians sealed their sarcophagi (stone coffins) with cork, while the ancient Greeks and Romans used it for anything from beehives to sandals.

And the cork oak itself is an extraordinary tree. Its bark grows up to 20 cm in thickness, insulating the tree like a coat wrapped around the trunk and branches and keeping the inside at a constant 20°C all year round. Developed

most probably as a defence against forest fires, the bark of the cork oak has a particular cellular structure – with about 40 million cells per cubic centimetre – that technology has never succeeded in replicating. The cells are filled with air, which is why cork is so buoyant. It also has an elasticity that means you can squash it and watch it spring back to its original size and shape when you release the pressure.

Cork oaks grow in a number of Mediterranean countries, including Portugal, Spain, Italy, Greece and Morocco. They flourish in warm, sunny climates where there is a minimum of 400 millimetres of rain per year, and not more than 800 millimetres. Like grape vines, the trees thrive in poor soil, putting down deep roots in search of moisture and nutrients. Southern Portugal's Alentejo region meets all of these requirements, which explains why, by the early 20th century, this region had become the world's largest producer of cork, and why today it accounts for roughly half of all cork production around the world.

Most cork forests are family-owned. Many of these family businesses, and indeed many of the trees themselves, are around 200 years old. Cork production is, above all, an exercise in patience. From the planting of a cork sapling to the first harvest takes 25 years, and a gap of approximately a decade must separate harvests from an individual tree. And for top-quality cork, it's necessary to wait a further 15 or 20 years. You even have to wait for the right kind of summer's day to harvest cork. If the bark is stripped on a day when it's too cold – or when the air is damp – the tree will be damaged.

Cork harvesting is a very specialised profession. No mechanical means of stripping cork bark has been invented, so the job is done by teams of highly skilled workers. First, they make vertical cuts down the bark using small sharp axes, then lever it away in pieces as large as they can manage. The most skilful cork-strippers prise away a semi-circular husk that runs the length of the trunk from just above ground level to the first branches. It is then dried on the ground for about four months, before being taken to factories, where it is boiled to kill any insects that might remain in the cork. Over 60% of cork then goes on to be made into traditional bottle stoppers, with most of the remainder being used in the construction trade. Corkboard

and cork tiles are ideal for thermal and acoustic insulation, while granules of cork are used in the manufacture of concrete.

Recent years have seen the end of the virtual monopoly of cork as the material for bottle stoppers, due to concerns about the effect it may have on the contents of the bottle. This is caused by a chemical compound called 2,4,6-trichloroanisole (TCA), which forms through the interaction of plant phenols, chlorine and mould. The tiniest concentrations – as little as three or four parts to a trillion – can spoil the taste of the product contained in the bottle. The result has been a gradual yet steady move first towards plastic stoppers and, more recently, to aluminium screw caps. These substitutes are cheaper to manufacture and, in the case of screw caps, move conveniently for the user.

The classic cork stopper does have several advantages, however. Firstly, its traditional image is more in keeping with that of the type of high quality goods with which it has long been associated. Secondly – and very importantly – cork is a sustainable product that can be recycled without difficulty. Moreover, cork forests are a resource which support local biodiversity, and prevent desertification in the regions where they are planted. So, given the current concerns about environmental issues, the future of this ancient material once again looks promising.

Questions 1-5

Do the following statements agree with the information given in Reading Passage 1?

In boxes 1-5 on your answer sheet, write

TRUE : if the statement agrees with the information

FALSE : if the statement contradicts the information

NOT GIVEN if there is no information on this

1. The cork oak has the thickest bark of any living tree.

2. Scientists have developed a synthetic cork with the same cellular structures as natural cork.
3. Individual cork oak trees must be left for 25 years between the first and second harvest.
4. Cork bark should be stripped in dry atmospheric conditions.
5. The only way to remove the bark from cork oak trees is by hand.

Source: <https://ieltsfeverapp.com/Cork>

Reading Summary

Approach	Reason
Spend 20 minutes on each passage and its questions. This should include the time you need to write the answers on the answer sheet.	Treat each passage as a separate test. In 20 minutes you should be able to cover all the questions that you find straightforward.

The passages	Start with the first passage	The first passage may not be the easiest for you but you need to do them all, so get going!
	Read the title and subheading and consider what you expect the passage to be about.	You need to 'get into' each passage, so predicting the text type, content and structure will help you do this. If there is no title or subheading, use the opening paragraph to find the topic.
	You are not tested on prior knowledge of the topic.	Always check carefully that your answers to the questions come from the passage and not your own ideas.
	Skim the passage quickly before you start the questions.	As you do this, you can underline the key ideas in each paragraph. This will give you an overview of the content.

The questions	Start with the first set of questions	The questions have been arranged in a logical order, i.e. the first set of questions usually focuses on the first part of the passage or on the main ideas in the passage.
	Read the instructions very carefully	It is silly to lose marks because you didn't check the instructions; for example, gap fill questions can have a limit of one, two or three words.
	Use the strategies that you have learned, to help you do each set of questions.	Some IELTS questions are very different from others. You can work faster if you know and understand these differences. For example, which questions follow the order of information in the passage and which don't?
	Try to check all your answers	Make sure that you have spelled words correctly, especially those that you copy from the passage. You will lose marks for misspelling.

Source: New Insight into IELTS - Cambridge

Answer Key

SHORT ANSWER

In-Class Content

Ex 1 : Armenian Shoe

1. 5500 years (old)
2. grass
3. cool, dry conditions
4. sheep dung
5. 600-700 years old
6. leather and grass
7. Ms. Diana Zardaryan
8. (up to) 1950s

Ex 2 : US Food waste worth more than offshore drilling

1. 25 percent/ 25%/ twenty -five percent
2. 2150 trillion kilojoules

Ex 3 : The Dingo -An Australian Pest

1. South-East Asian fishermen / Indonesian fishermen / ancestral aborigines (any answer)
2. drinking water
3. gait / ears / bark (all three words needed)
4. food supply
5. Tasmanian tiger / thylacine (either answer)
6. 10 years

SHORT ANSWER

7. very young age
8. a pest

Ex 4 : The Northern Lights

1. electrons and protons
2. atmosphere

Practice 1 : William Henry Perkin

8. rich
9. commercial (possibilities)
10. mauve
11. Robert Pullar
12. France
13. malaria

Practice 2 : Is there anybody out there

18. several billion years
19. radio waves / radio signals
20. 1000 stars

Practice 3 : The history of Tortoise

27. plants
28. breathing, reproduction
29. gills
30. dolphins

Practice 4 : Hearing impairment

7. two decades

Answer Key

SHORT ANSWER

In-Class Content

8. crowd (noise)
9. invisible
10. Objective 3

Practice 5 : Stepwells

6. pavilions
7. drought
8. tourists

Practice 6 : The Iron Bridge

28. 1638
29. 1781
30. 1934
31. 2001

Practice 7 : Such a Fascinating Game

17. (the) bishop
18. (to) accelerate play
19. (Garry) Kasparov

Practice 8 : Out of the Ashes

34. August 31st
35. human chains
36. blotting paper
37. dustbins

Practice 9 : It's Only a Cockroach

1. disgusting appearance
2. domestic hygiene

SHORT ANSWER

3. wasp
4. flatten(bodies)

Practice 10 : The start of automobiles history

20. petrol-fueled internal combustion
21. identity and status
22. 15 minutes
23. 1973 oil crisis
24. (a) gas-guzzler
25. fuel power
26. toxic gas

SENTENCE COMPLETION

In-Class Content

Ex 1 : How atoms were discovered

1. Brownian Motion
2. water molecules
3. planetary systems
4. (The) electrons

Ex 2 : A giant panda at a zoo in the United States has given birth to twin cubs.

1. ultrasound scan
2. on loan
3. reproduction rate
4. inhabited by humans

Answer Key

SENTENCE COMPLETION

Ex 3 : European Settlement of Australia

1. British penal colony
2. overcrowded prisons
3. economic opportunities
4. colonization
5. poor soil

Practice 1 : The meaning and power of smell

37. clothing
38. vocabulary
39. chemicals
40. cultures

Practice 2 : Striking back at Lightning with Lasers

4. power companies
5. safely
6. size

Practice 3 : The context, Meaning and Scope of Tourism

11. source of income / industry
12. employer
13. domestic tourism

Practice 4 : Bats

10. natural selection
11. radio waves/echoes
12. mathematical theories
13. zoologist

SENTENCE COMPLETION

Practice 5 : Cutty Sark : the fastest sailing ship of all time

9. wool
10. navigator
11. gale
12. training
13. fire

Practice 6 : The effect of light on plant and animal species

34. temperatures
35. day-natural plants
36. food resources
37. insects
38. rainfall
39. sugarcane
40. classification

Practice 7 : THE DAMS THAT CHANGED AUSTRALIA

11. sign language
12. hardships
13. engineering feat

Practice 8 : Pine Trees

1. growth ring
2. Methuselah sprouted
3. (pine) cones
4. durable

Answer Key

SENTENCE COMPLETION

Practice 9 : AUSTRALIA'S PLATYPUS

10. common but vulnerable
11. urban and agricultural
12. Food
13. permit/permission

Practice 10 : ILLEGAL DOWNLOADS

17. 30,000 dollars/30000 dollars/30,000 dollars/30000 dollars
18. Commercial
19. internet service provider

SUMMARY COMPLETION

In-Class Content

Ex 1 : Air Rage

1. incident
2. established
3. increased
4. predicted
5. traveler
6. assault

Ex 2 : The History of Thai food

1. harmony
2. contrast
3. waterborne
4. Chinese influences

SUMMARY COMPLETION

5. chillies
6. Japan/ Portugal/France
7. Japan/Portugal/France
8. Dairy products
9. coconut milk
10. longer periods

Ex 3 : The Cambridge Encyclopedia

1. frustration
2. First-time user
3. essential
4. special knowledge
5. legal formulations

Ex 4 : This Marvellous Invention

1. E
2. G
3. B
4. A

Practice 1 : Striking back at Lightning with Lasers

7. B
8. C
9. G
10. D

Practice 2 : The Little Ice Age

18. C
19. B
20. A

Answer Key

SUMMARY COMPLETION

- 21. H
- 22. G

Practice 3 : Attitudes to Language

- 9. H
- 10. F
- 11. A
- 12. C
- 13. B

Practice 4 : Young Children's sense of identity

- 24. mirror
- 25. communion
- 26. ownership

Practice 5 : Museums of fine art and their public

- 27. B
- 28. H
- 29. L
- 30. G
- 31. D

Practice 6 : Beyond the blue Horizon

- 27. B
- 28. F
- 29. I
- 30. G
- 31. D

SUMMARY COMPLETION

Practice 7 : It's Only a Cockroach

- 9. pheromones
- 10. co-operate
- 11. admiration

Practice 8 : The Pearl

- 5. ancient Rome
- 6. Persia
- 7. Mallorca
- 8. Japan
- 9. Australia
- 10. Bahrain

Practice 9 : Elephant Communication

- 32. trunks and feet
- 33. infrasonic/low
- 34. ecology
- 35. seismic signals
- 36. auditory communication
- 37. mate
- 38. ground

Practice 10 : AUSTRALIA'S PLATYPUS

- 6. (movable/moveable) spur
- 7. two buds
- 8. (underground) nest
- 9. (rich) milk

Answer Key

MULTIPLE CHOICE QUESTIONS

In-Class Content

Ex 1 : Sir Isaac Newton and Alchemy

1. A
2. B
3. B
4. C

Ex 2 : Environmental management

10. C
11. B
12. D

Ex 3 : Ants secrete aphid tranquilizer from their feet

1. A
2. D
3. D
4. C

Ex 4 : Why does coffee shoot out of the lid of your cup?

1. C
2. C
3. A
4. A

Practice 1 : MAKING THE MOST OF TRENDS

27. D

MULTIPLE CHOICE QUESTIONS

28. C
29. A
30. D
31. D

Practice 2 : Neuroaesthetics

1. C
2. D
3. B
4. A

Practice 3 : An Introduction to Film Sound

1. B
2. A
3. B
4. D
5. C

Practice 4 : The psychology of innovation

1. C
2. A
3. D
4. B

Practice 5 : Museums of fine art and their public

6. C
7. D
8. A

Answer Key

MULTIPLE CHOICE QUESTIONS

9. D

Practice 6 : Ancient voyagers who settled the far-flung islands of the Pacific Ocean

6. C

7. A

8. D

9. C

Practice 7 : When evolution runs backwards

1. C

2. D

3. C

4. B

5. A

Practice 8 : A neuroscientist reveals how to think differently

1. C

2. B

3. D

4. C

5. B

Practice 9 : Educating Psyche

1. D

2. A

3. B

4. C

MULTIPLE CHOICE QUESTIONS

Practice 10 : Why pagodas don't fall down

11. D

12. C

13. C

FLOW CHART

In-Class Content

Ex 1 : DOLL RESTORATION

1. eye mechanism

2. loose head

3. removed

4. mohair wig

5. eye system

6. chemically cleaned

7. old dirt, wax

8. porcelain teeth

9. original eye system

10. cleaned and restyled

11. period

Practice 1 : The history of Tortoise

34. 3 measurements

35. triangular graph

36. cluster

37. amphibious

38. half way

Answer Key

FLOW CHART

39. dry-land tortoises

Practice 2 : Dealing with your office emails

- 22. obvious spam
- 23. message time
- 24. prompt attention
- 25. reply immediately
- 26. brief acknowledgement
- 27. definite date

Practice 3: Border crossing for commercial vehicles

- 15. shipment
- 16. photo ID
- 17. (cab) lights
- 18. sleeper areas
- 19. immigration
- 20. charge

Practice 4: Criminal Rehabilitation: A Difficult Issue

- 32. high moral standing
- 33. parole officer
- 34. regulatory condition
- 35. parole violation hearing

Practice 5 : How to run a successful project

- 21. budget
- 22. scope creep

FLOW CHART

- 23. skills
- 24. clear communication
- 25. interim milestones
- 26. contingency plans
- 27. report

Practice 6 : The Australian Visa Application Process Explained

- 27. online/over the internet
- 28. I Agree box
- 29. terms and conditions
- 30. truly and honestly
- 31. 40 minutes
- 32. each screen
- 33. Review
- 34. reference
- 35. prompted
- 36. transaction reference number

Practice 7 : Production line

- 21. Potential
- 22. Coordinator
- 23. Action teams
- 24. Team leaders

Practice 8 : HAZARD MANAGEMENT

- 37. High priority
- 38. Eliminate (hazard)
- 39. (to) Store
- 40. Minimise

Answer Key

TABLE COMPLETION

In-Class Content

Ex 1 : Changes in Industrial Britain

1. postal charges
2. telegraph
3. (mid) 1860s
4. New York
5. (mid) 1870s
6. minutes
7. Bombay

Practice 1 : The Birth of Scientific English

38. popular
39. Principia / the Principia / Newton's Principia / mathematical treatise
40. local / more local / local audience

Practice 2 : The Impact of Wilderness Tourism

10. cheese
11. tourism/tourist/tour
12. pottery
13. jewellery/jewelry

Practice 3 : Telepathy

31. sender
32. picture/image
33. receiver
34. sensory leakage, (outright) fraud IN EITHER ORDER

TABLE COMPLETION

35. sensory leakage, (outright) fraud IN EITHER ORDER
36. computers
37. human involvement
38. meta-analysis
39. lack of consistency
40. big/large enough

Practice 4: Stepwells

9. Earthquake
10. Four sides/4 sides
11. Tank
12. verandas/verandahs
13. underwater

Practice 5 : Reducing the Effects of Climate Change

30. sunshade
31. iron
32. algae
33. clouds
34. cables
35. snow
36. rivers

Answer Key

DIAGRAM LABELLING

In-Class Content

Ex 1 : Simple Chemical Experiments

1. hydrochloric acid
2. cork
3. (graduated) glass cylinder
4. zinc
5. thistle funnel
6. hydrogen gas
7. test tube
8. tap water

Practice 1 : What's so funny?

21. problem solving
22. temporal lobes
23. evaluating information

Practice 2 : A Chronicle of Timekeeping"

9. (ship's) anchor/(an/the) anchor
10. (escape) wheel
11. tooth
12. (long) pendulum
13. second

Practice 3 : Collecting Ant Specimens

37. heat
38. leaf litter
39. screen
40. alcohol

DIAGRAM LABELLING

Practice 4 : Tidal Power

10. maintenance
11. slow (turning)
12. low pressure
13. cavitation

Practice 5 : The Falkirk Wheel

7. gates
8. Clamp
9. axle
10. cogs
11. aqueduct
12. wall
13. locks

Practice 6 : Raising the Mary Rose

9. (lifting) frame
10. hydraulic jacks
11. stabbing guides
12. (lifting) cradle
13. air bags

Practice 7 : Elephant communication

28. Hammer
29. Massive
30. Pad
31. Sinus cavities

Practice 8 : DUNG BEETLES

6. South African
7. French

Answer Key

DIAGRAM LABELLING

In-Class Content

8. Spanish

Practice 9 : The Brooklyn Bridge

- 8. debris shaft
- 9. compressed air
- 10. air lock
- 11. work chamber

Practice 10 : GLASS - Capturing the dance of light

- 6. molten glass//ribbon of glass//molten glass ribbon
- 7. belt of steel//steel belt//moving belt
- 8. (lightbulb) moulds

MATCHING HEADINGS

In-Class Content

Ex 1 :

- A. vi
- B. iii
- C. iv
- D. viii
- E. x

Practice 1 : Is there anybody out there?

14. iv

MATCHING HEADINGS

15. vii

16. i

17. ii

Practice 2 : The development of museums

- 27. ii
- 28. vi
- 29. ii
- 30. iii

Practice 3 : European Transport systems

- 1. viii
- 2. iii
- 3. xi
- 4. i
- 5. v
- 6. x
- 7. ii
- 8. iv

Practice 4 : Tea and the industrial revolution

- 1. iv
- 2. viii
- 3. vii
- 4. i
- 5. vi
- 6. ix
- 7. ii

Answer Key

MATCHING HEADINGS

Practice 5 : The context meaning and scope of tourism

1. ii
2. i
3. v
4. vii

Practice 6 : What destroyed the civilization of easter island?

1. ii
2. ix
3. viii
4. i
5. iv
6. vii
7. vi

Practice 7 : What's the purpose of gaining knowledge?

1. vi
2. viii
3. ii
4. iv
5. iii
6. vii

Practice 8 : The lost city

14. iv
15. vi

MATCHING HEADINGS

16. viii
17. v
18. i
19. vii
20. iii

Practice 9 : The little ice age

14. ii
15. vii
16. ix
17. iv

Practice 10 : Air traffic control in Usa

14. ii
15. iii
16. v
17. iv
18. viii
19. vii

GLOBAL QUESTION

Practice 1 : Global Question

- A. 7
- B. 5
- C. 9
- D. 6

Answer Key

GLOBAL QUESTION

In-Class Content

- E. 2
- F. 4
- G. 1
- H. 10

- 1. C

Practice 2 : Global Question

- 1. ix
- 2. viii
- 3. vii
- 4. x
- 5. v
- 6. i
- 7. iii

- 1. C

Practice 3 : Global Question

- A. 2
- B. 8
- C. 4
- D. 5
- E. 1
- F. 6
- G. 9

- 1. A

MATCHING INFORMATION /CLASSIFICATION

In-Class Content

Ex 1: Search for Extraterrestrial Intelligence

- A. v
- B. iv
- C. vii
- D. I
- E. ii

Ex 2: The origin of Languages

- 1. E
- 2. B
- 3. D

Practice 1 : Tidal power

- 14. C
- 15. E
- 16. A
- 17. C

Practice 2 : Information theory the big idea

- 27. D
- 28. F
- 29. B
- 30. E
- 31. A
- 32. C

Practice 3 : Autumn leaves

- 1. C
- 2. B

Answer Key

MATCHING INFORMATION /CLASSIFICATION

- 3. H
- 4. B
- 5. E

Practice 4 : Second nature

- 23. E
- 24. C
- 25. G
- 26. H

Practice 5 : Reducing the effects of climate change

- 27. D
- 28. B
- 29. A

Practice 6 : Raising the many rose

- 5. C
- 6. B
- 7. G
- 8. A

Practice 7 : The risk agriculture faces in developing countries

- 1. A
- 2. B
- 3. H

Practice 8 : Let's go bats

- 1. B

MATCHING INFORMATION /CLASSIFICATION

- 2. A
- 3. A
- 4. E
- 5. D

Practice 9 : The true of food

- 14. E
- 15. B
- 16. C
- 17. B

Practice 10 : Australia's sporting success

- 1. B
- 2. C
- 3. B
- 4. F
- 5. D
- 6. A
- 7. E

TRUE/FALSE/NOT GIVEN - YES/NO/NOT GIVEN

In-Class Content

Ex 1 : Programmable plants

- 1. TRUE
- 2. TRUE
- 3. FALSE

Answer Key

TRUE/FALSE/NOT GIVEN - YES/NO/NOT GIVEN

Ex 2 : THAMES TUNNEL

1. TRUE
2. TRUE
3. NOT GIVEN
4. FALSE

Ex 3 : Making sense of scent

14. FALSE
15. FALSE
16. TRUE
17. FALSE
18. FALSE
19. TRUE

Ex 4 : Alaskans' vitamin D production slows to a halt

1. FALSE
2. NOT GIVEN
3. NOT GIVEN
4. TRUE
5. FALSE
6. TRUE
7. NOT GIVEN
8. TRUE
9. NOT GIVEN

Practice 1 : William Henry Perkin

1. FALSE
2. NOT GIVEN
3. FALSE

TRUE/FALSE/NOT GIVEN - YES/NO/NOT GIVEN

4. TRUE
5. NOT GIVEN
6. TRUE
7. NOT GIVEN

Practice 2 : The Search for Extra-Terrestrial Intelligence

1. TRUE
2. TRUE
3. NOT GIVEN
4. FALSE
5. NOT GIVEN
6. FALSE

Practice 3 : The Context, Meaning and Scope of Tourism"

1. TRUE
2. NOT GIVEN
3. NOT GIVEN
4. TRUE
5. NOT GIVEN
6. FALSE

Practice 4 : Beyond the blue horizon

1. NO
2. YES
3. NOT GIVEN
4. YES
5. NOT GIVEN

Answer Key

TRUE/FALSE/NOT GIVEN - YES/NO/NOT GIVEN

Practice 5 : Why Pagodas Don't Fall Down

1. YES
2. NO
3. NOT GIVEN
4. YES

Practice 6 : True Cost of Food

1. YES
2. NOT GIVEN
3. NO
4. YES

Practice 7 : Raising the Mary Rose

1. TRUE
2. NOT GIVEN
3. TRUE
4. FALSE

Practice 8 : Neuroaesthetics

1. NOT GIVEN
2. YES
3. NO
4. NO
5. YES
6. NOT GIVEN

Practice 9 : The Benefits of Being Bilingual

1. YES

TRUE/FALSE/NOT GIVEN - YES/NO/NOT GIVEN

2. NOT GIVEN
3. NO
4. NO
5. NOT GIVEN

Practice 10 : Cork

1. NOT GIVEN
2. FALSE
3. FALSE
4. TRUE
5. TRUE